PROJECT PIPELINE

FR-23-08: SPOTSYLVANIA COUNTY
ROUTE 3 (PLANK ROAD) FROM EAST OF I-95 SB RAMPS TO TASKFORCE DRIVE

DRPT Office of INTERMODAL Planning and Investment VDOT

Route 3 (Plank Road) from East of I-95 SB Ramps to Taskforce Drive (FR-23-08)

Final Report

August 21, 2024

Prepared for

VDOT Virginia Department of Transportation

Prepared by

9201 Arboretum Parkway, Suite 301
Richmond, Virginia 23236

Table of Contents

Chapter 1:

Needs Evaluation and Diagnosis

Introduction

Project Pipeline is a performance-based planning program to identify cost-effective solutions to multimodal transportation needs in Virginia. Through this planning process, projects and solutions may be considered for funding through programs, including SMART SCALE, revenue sharing, interstate funding, and others. Visit the Project Pipeline webpage for additional information: vaprojectpipeline.org.

This study focuses on concepts targeting identified needs including congestion mitigation, safety improvement, pedestrian and bicycle infrastructure along the corridor, and transit access. The objectives of Project Pipeline are shown below in ***Figure 1.***

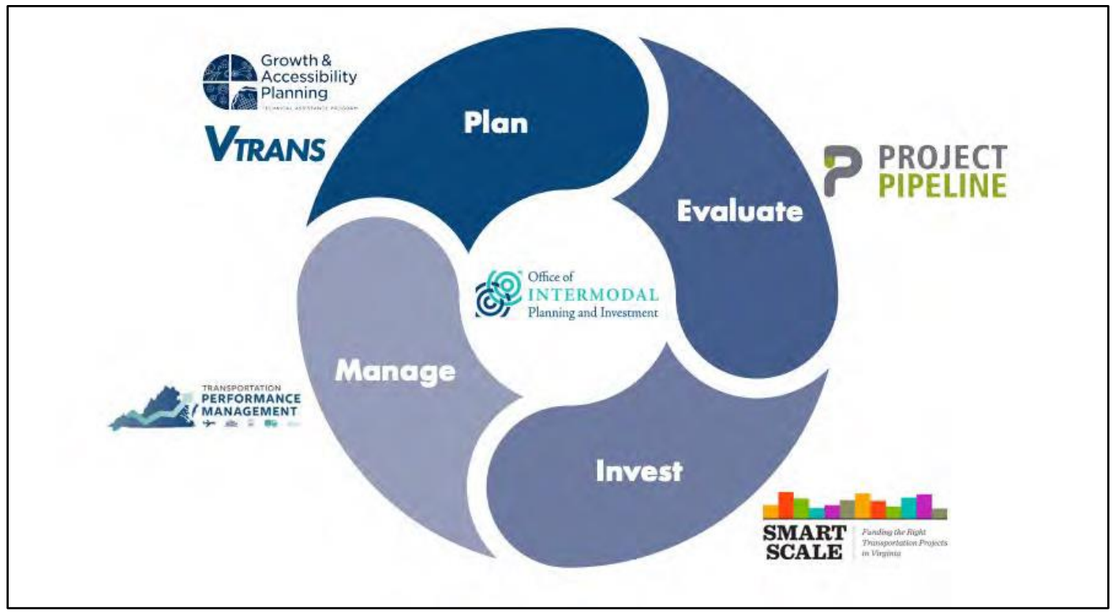


Figure 1: Project Pipeline Objectives

Background

The Office of Intermodal Planning and Investment (OIPI) prepared the VTrans Virginia's statewide transportation plan for the Commonwealth Transportation Board (CTB) in which mid-term needs (0 - 10 years) were identified for different categories listed in ***Table 1***. This study focuses on addressing needs identified in VTrans, and those previously identified by the localities.

Table 1: List of VTrans Needs

VTrans Needs
Safety Improvement
Transportation Demand Management
Congestion Mitigation
Pedestrian Safety Improvement
Transit Access
Capacity Preservation
Bicycle Access

Methodology

The study is broken down into three phases. Phase I is the problem diagnosis and brainstorming alternatives, Phase II is the alternative evaluation and sketch level analysis, and Phase III is the investment strategy and cost estimates. Details on methods and solutions for each study phase are outlined below ***Figure 2***.

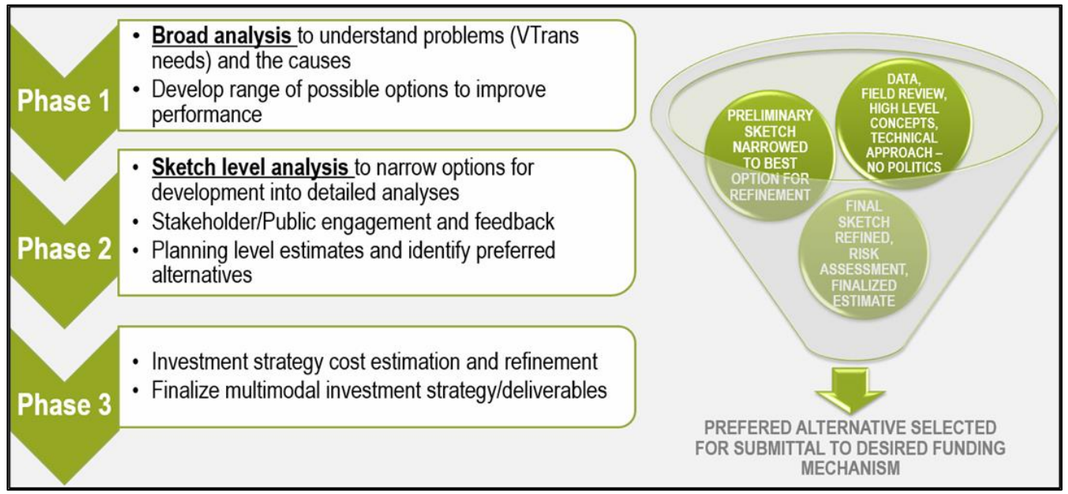


Figure 2: Study Phase Methods and Solutions

The study team is broken down into Technical Teams to improve the efficiency and effectiveness of the study process through extensive collaboration. To achieve the intended efficiency and consistency, it is generally expected that the same Technical Team will be responsible for all studies within a district for the duration of the cycle.

Each Technical Team will include certain leadership and technical roles that will be needed for each study, including the following:

- VDOT District Planning Project Manager – Provides leadership and direction; has overall responsibility for the study progress and outcomes.
- Consultant Team Manager – Provides direct support to the VDOT District Planning Project Manager; coordinates the work and technical efforts of consultant staff.
- District Planning Staff – Provides technical input regarding capacity, forecasting, land use, multimodal, and planning.
- District Traffic Engineering Staff – Provide technical input regarding safety and operations.
- Consultant Team Technical Staff – Provides multidisciplinary input, analysis, technical support, and expertise for the identified VTrans need categories.

A sample organizational chart, including the roles, responsibilities, and structure of a Technical Team is shown below in ***Figure 3***.

Figure 3: Structure of a Technical Team

Additional team members and roles should be considered where appropriate. Certain roles may not be necessary for all studies. However, the following roles may contribute to study success during different stages and/or for different types of study areas, as shown in ***Table 2***.

Table 2: Roles and Responsibilities for the Technical Team and SWGs

Phase	Responsibility	Role					
		OIPI/Program Support	District	Consultant	DRPT	Locality	VDOT Central Office
Study Selection & Initiation	Identify Study Needs and Priorities		X		X	X	
	Coordinate with CTB Members	X	X				
	Approve final study locations	X					
	Data Collection Planning		X				
	Data Dashboards	X					
	Assign Consultants & Issue Consultant Task Orders	X					X
Phase 1	Initiate Study & Hold Kickoff Meeting		X	X	X		
	Prepare Framework Document		X	X			
	Approve Framework Document		X		X	X	
	Provide Existing Data		X		X	X	
	Collect New Data			X			
	Coordinate with local leaders					X	
	Conduct & Support Initial Public Outreach (if desired)	X	X	X		X	X
	Diagnose Existing Needs			X			
	Brainstorm & Develop Preliminary Alternatives		X	X	X		X
	Present Diagnosis & Alternatives to SWG			X			
	Provide Feedback and Input on Analysis & Alternatives					X	
	Develop Phase 2 Scope of Work			X			
	Approve Scope & Issue Consultant Task Orders	X					X
Phase 2	Conduct Detailed Analysis of Alternatives			X			
	Develop Refinements to Alternatives		X	X	X		X
	Present Alternative Analysis Findings to SWG		X	X			
	Provide Feedback on Alternatives				X	X	X
	Prepare Planning Level Cost Estimates			X			
	Conduct & Support Public Outreach on Alternatives	X	X	X		X	
	Concurrence on Preferred Alternative(s)		X		X	X	X
	Develop Phase 3 Scope of Work			X			
	Approve Scope & Issue Consultant Task Orders	X					X
Phase 3	Conduct Alternative Risk Assessment		X	X			X
	Develop Practical Concept Design & Address Risk of Preferred Alternative		X	X			
	Prepare Cost Estimate with Workbook			X			
	Document Assumptions & Basis of Cost			X			
	Review & Concur with Concept & Estimate		X		X		X
Investment, Application, & Closeout	Prepare Final Study Deliverables, Design Packages, and Estimates			X			
	Apply for Funding of Preferred Alternative(s)				X	X	
	Application Support	X	X	X			
	Submit and Documentation and All Related Work			X			
	Review and approve final deliverables for public visibility		X		X		
	Program Closeout and Summary	X					

Study Area

The Route 3 (Plank Road) study corridor starts from east of the I-95 southbound (SB) off ramp to Taskforce Drive, and it is located in Spotsylvania County, Virginia. The study section of Route 3 is 0.85 miles long and is classified as a principal arterial roadway with a posted speed limit of 45 miles per hour (MPH). It has sections with three and four through lanes in each direction. A map detailing the location of the study intersections along Route 3 is shown below in ***Figure 4.***

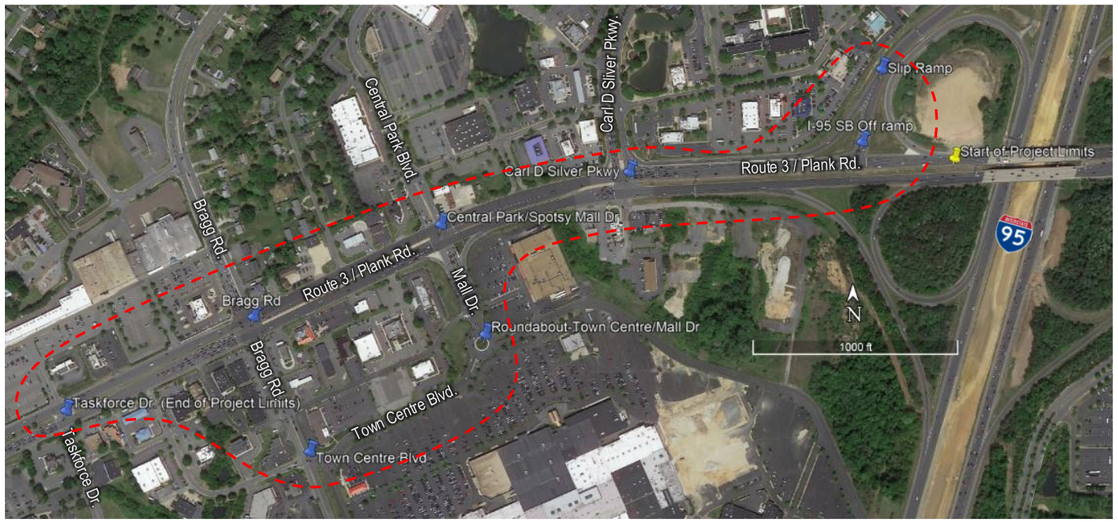


Figure 4: Route 3 Study Area Map

The study intersections are as follows:

1. Route 3 at Taskforce Drive (**signalized**)
2. Route 3 at Bragg Road (**signalized**)
3. Route 3 at Central Park/Mall Drive (**signalized**)
4. Route 3 at Carl D Silver Parkway/Mall Court (**signalized**)
5. I-95 SB off ramp (**signalized**)
6. Town Center Boulevard at Bragg Road (unsignalized)
7. Roundabout at Town Centre Boulevard/Spotsylvania Mall Drive (unsignalized)

---

[1] Commonwealth Transportation Board, Actions to Approve the 2019 VTrans Vision, Goals, Objectives, Guiding Principles and the 2019 Mid-term Needs Identification Methodology and Accept the 2019 Mid-term Needs, January 15, 2020

VTrans is Virginia's statewide transportation plan. It identifies and prioritizes locations with transportation needs using data-informed transparent processes. The policy for identifying VTrans mid-term needs establishes multimodal need categories that correspond to the Commonwealth Transportation Board-adopted VTrans visions, goals, and objectives.[1] Each need category has one or more performance measures and thresholds to identify one or more needs. Visit the VTrans policy guide for additional information: https://vtrans.org/resources/VTrans_Policy_Guide_v6.pdf.

These mid-term needs, identified in VTrans, are prioritized as Low, Medium, High, and Very High. These mid-term needs are updated every two years. The 2021 mid-term needs identified in VTrans for the Route 3 study corridor were identified 'Very High' for Bicycle Access, Capacity Preservation, Congestion Mitigation, Pedestrian Access, Safety Improvement, Pedestrian and Safety Improvement, and Transportation Demand Management and 'High' for IDEA (UDA) Access and Transit Access, as presented in ***Table 3.***

Table 3: VTrans Needs in Study Area

VTRANS IDENTIFIED NEEDS	PRIORITIES
Bicycle Access	Very High
Capacity Preservation	Very High
Congestion Mitigation	Very High
IEDA (UDA) Access	High
Pedestrian Access	Very High
Safety Improvement	Very High
Pedestrian Safety Improvement	Very High
Reliability	None
Rail On-time Performance	None
Transit Access	High
Transit Access for Equity Emphasis Areas	None
Transportation Demand Management	Very High

Background Studies, Projects, Planning Documents

Route 3 Operational Improvement Project (UPC 113172)

The Route 3 Operational Improvement project (UPC 113172) is funded through the Revenue Sharing Program. The estimated Advertisement date for the project is late 2023 with an estimated construction start date of Spring 2024 and completion in Fall 2024. A summary of project improvements within our study corridor are:

- Elimination of the right-turn bump out area on Route 3 westbound at Bragg Road to a shared through-right lane, as shown in ***Figure 5***.

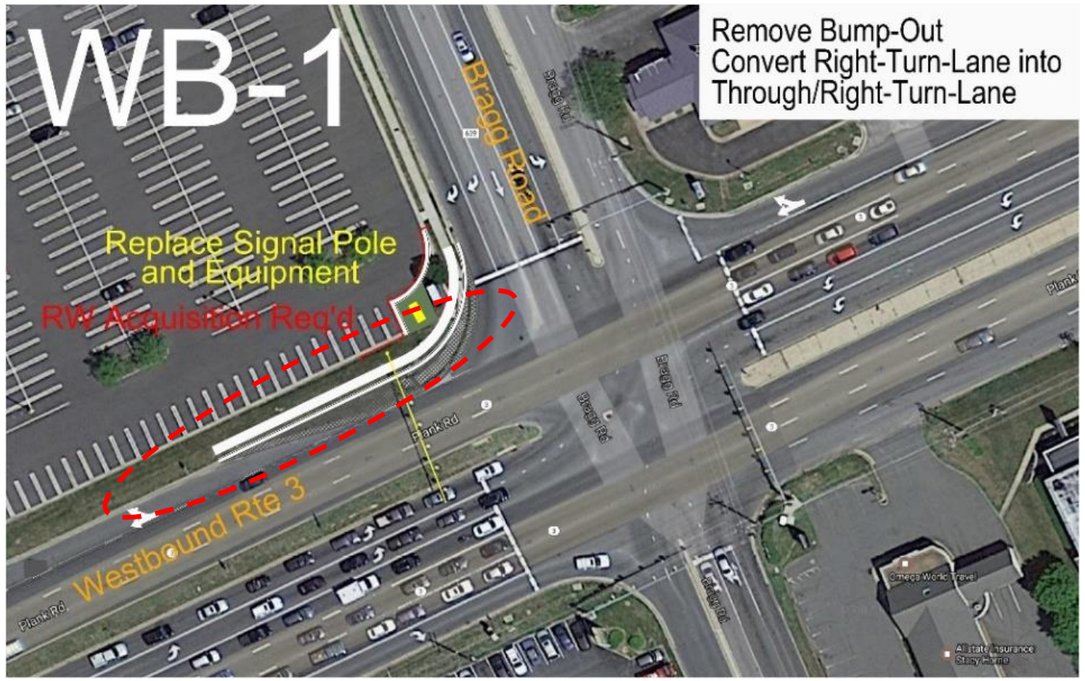


Figure 5: Route 3 Proposed Improvements at Bragg Road (Source: VDOT website)

- Modification of the concrete islands on Route 3 at Spotsylvania Mall Drive to become an eastbound shared through-right travel lane, as shown in ***Figure 6***. Dual northbound right-turn lanes will be re-striped and signalized.

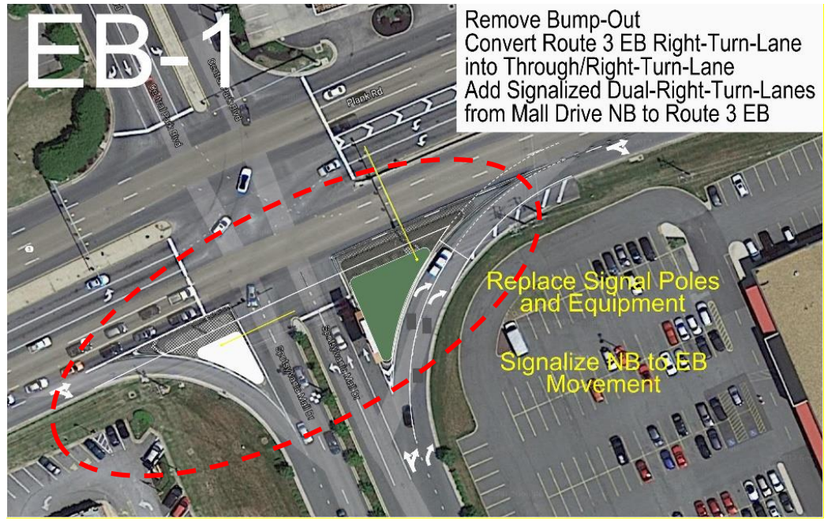


Figure 6: Route 3 Proposed Improvements at Spotsylvania Mall Drive (Source: VDOT website)

FR01: Spotsylvania Co./City of Fredericksburg Project Pipeline Study (SMART SCALE Round 5) (UPC 119947)

The FR01 project pipeline study reviewed Route 3 (Plank Road) from Andora Drive to Carl D Silver Parkway. This study identified existing safety and operational concerns along the Route 3 corridor and proposed numerous alternatives to alleviate those concerns. Alternatives that were identified during the Phase 2 review included a thru-cut configuration for Route 3 at Taskforce Drive, a grade separation for local and through traffic from I-95 to Bragg Road, a flyover ramp from Route 3 to Mall Court, as shown in ***Figure 7*** and an at-grade connection from Route 3 to Mall Court, as shown in ***Figure 8.*** All these alternatives also included proposed pedestrian improvements at the study intersections and along Route 3. Ultimately, the study submitted a pre-application for corridor wide pedestrian improvements, however, the application was removed from SMART SCALE consideration for that round.

Figure 7: FR01 Mall Court Flyover Concept (Source: FR01 Project Pipeline Report – UPC 119947, 12/13/2022)

Figure 8: At-grade Connection from Route 3 to Mall Court (Source: FR01 Project Pipeline Report – UPC 119947, 12/13/2022)

Pedestrian Safety Action Plan (PSAP) Projects

VDOT's PSAP identified the intersections of Route 3 at Bragg Rd. and Route 3 at Spotsylvania Mall Drive with "Pedestrian Crossing" initiative under UPC 116208. This UPC number is associated with district-wide systemic pedestrian crossings. These crossings are anticipated to be constructed either in summer or fall 2024.

I-95 Rappahannock River Crossing (I-95 NB UPCs – 105510, 112520 &113936) & (I-95 SB UPC – 101595)

This project is being constructed in two phases, I-95 northbound and I-95 southbound. The I-95 southbound portion of the project is completed and open to traffic. The I-95 northbound portion of the project was completed in November 2023, during the production of this report. This project will provide separate lanes for through traffic and local traffic, as shown in ***Figure 9.***

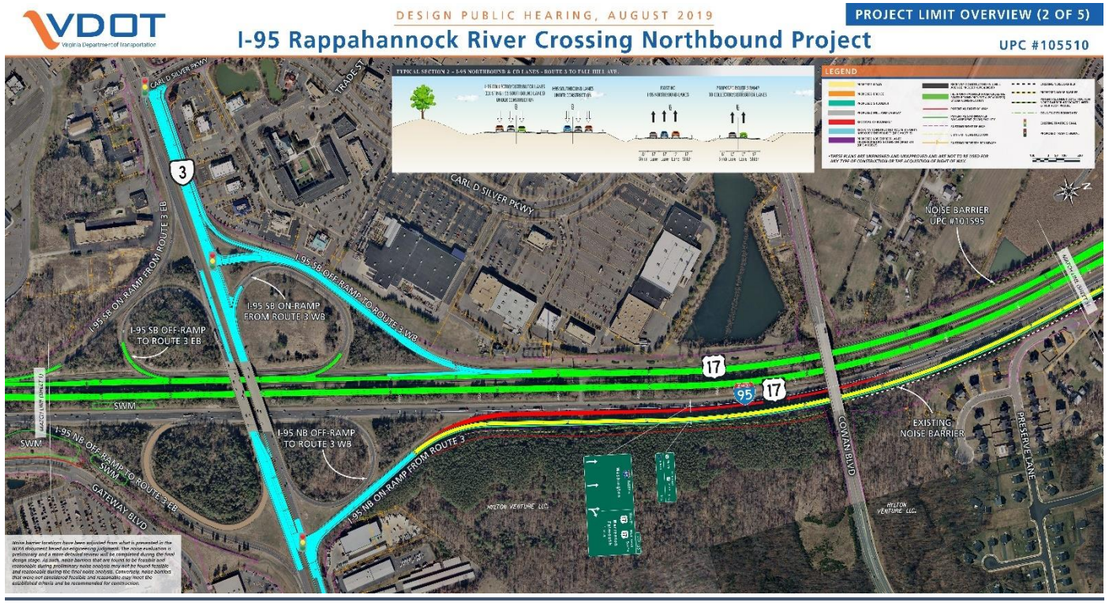


Figure 9: I-95 NB Rappahannock River Crossing Concept (Source: FR01 Project Pipeline Report, 12/13/2022)

Apartments at Spotsylvania Towne Center Development Project

A portion of Spotsylvania Town Center Mall, which was previously a Sears store, is being built out into 271 apartments. The apartment buildings are currently under construction and anticipated to be completed towards the end of 2024.

Fredericksburg Area Metropolitan Planning Organization (FAMPO) I-95 Corridor Study – Phase 2

FAMPO conducted the Phase 2 of their I-95 corridor study in the Fredericksburg region, which was completed in December 2018. Phase 1 of this study was completed in 2016. The study's focus was on mainline capacity and improvements to existing interchanges. Through their study at least two secondary recommendations have the potential to greatly impact traffic for the study area. One secondary recommendation is the construction of a new interchange near milepost 131, which would connect I-95 to Carl D Silver Pkwy & Gordon W Shelton Blvd., shown as a high-level concept in ***Figure 10***. The second recommendation is a new interchange at I-95 and Harrison Road near mile post 128, shown as a concept in ***Figure 11***. While changes to adjacent land uses have occurred since this study, FAMPO is recommending additional studies to investigate both interchanges.

Figure 10: FAMPO Secondary Recommendation - Interchange near mile post 131 (Source: FAMPO I-95 Phase 2 Corridor Study Final Report 12/06/18)

Figure 11: FAMPO Secondary Recommendation - Harrison Road Interchange Concept (Source: FAMPO I-95 Phase 2 Corridor Study Final Report 12/06/18)

FAMPO East-West Mobility Study (UPC 120792)

This study was performed to evaluate 13 east-west corridors within the organization's jurisdiction that previously were identified as highly congested areas. The congestion on Route 3 was discussed in the study where two projects were identified to help alleviate traffic on the corridor, an interchange on I-95 at Harrison Road, and provided an interchange at MP 131 at I-95. These two recommendations are the same proposed improvements that are discussed in the "FAMPO I-95 Corridor Study – Phase 2" section but have the interchange at MP 131 with an updated concept shown in ***Figure 12*** due to a change in land use since the I-95 study. In addition to these two improvements, the study recommends the construction of a shared use path along Carl D Silver Parkway from Fall Hill Avenue to Spotsylvania Towne Center. This proposed path is shown in ***Figure 13***.

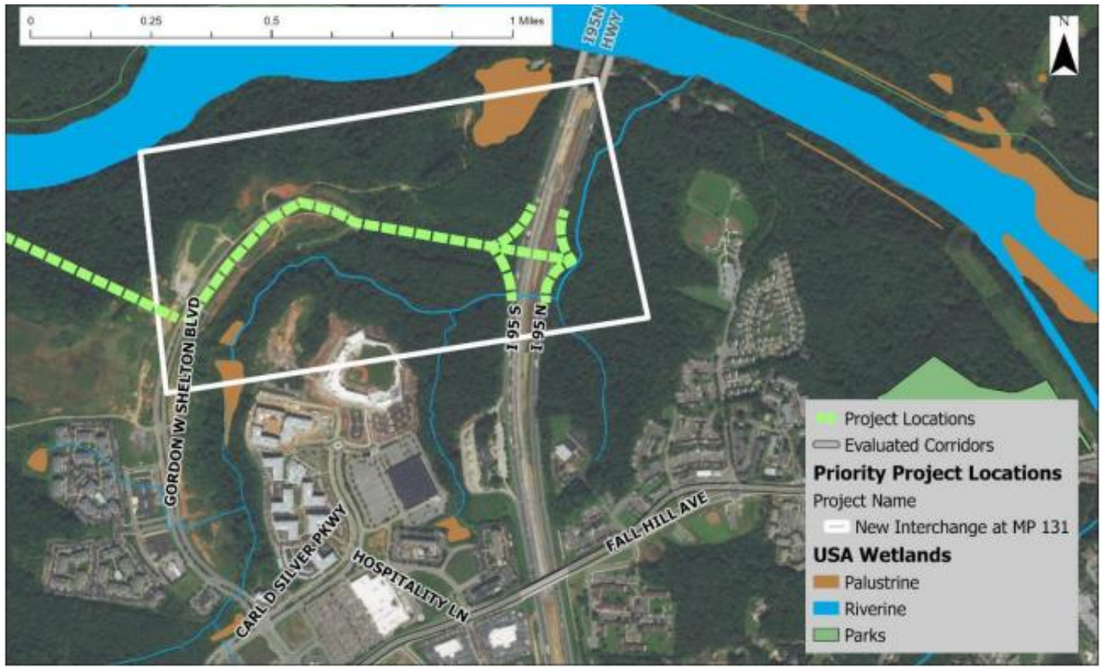


Figure 12: FAMPO East-West Mobility Study – I-95 and MP 131 Interchange Concept (Source: FAMPO Intraregional Multimodal East-West Mobility Study: Draft Roadway Report, Adopted 02/27/2023)

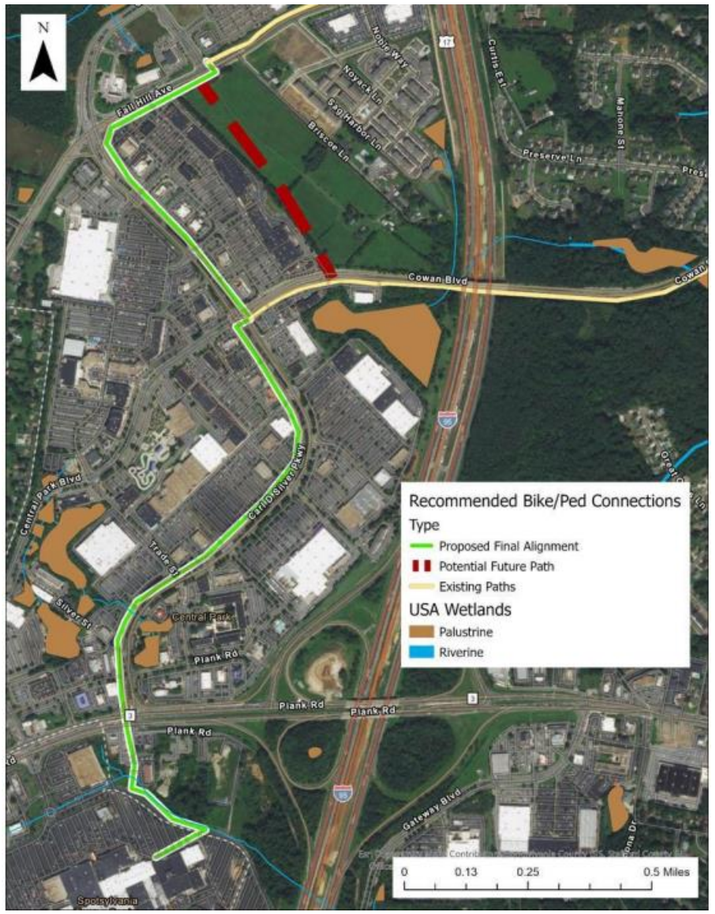


Figure 13: FAMPO East-West Mobility Study - Proposed Shared Use Path (Source: FAMPO Intraregional Multimodal East-West Mobility Study: Draft Roadway Report, Adopted 02/27/2023)

City of Fredericksburg Comprehensive Plan

As part of the City of Fredericksburg's 2015 Comprehensive Plan (amended in 2022), potential roadway improvements are identified in their transportation plan. These improvements include a new interchange and ramp near mile post 131, a proposed bridge over I-95 between Carl D Silver Pkwy and Gateway Blvd., and a new southbound ramp from I-95 SB to Central Park Boulevard. The proposed bridge over I-95 would connect Carl D Silver Pkwy to the proposed future extension of Gateway Blvd., which is shown as improvement 16 in ***Figure 14***. The new southbound ramp that would connect Central Park Boulevard is shown at Retail drive and is labeled on ***Figure 14*** as improvement 17.

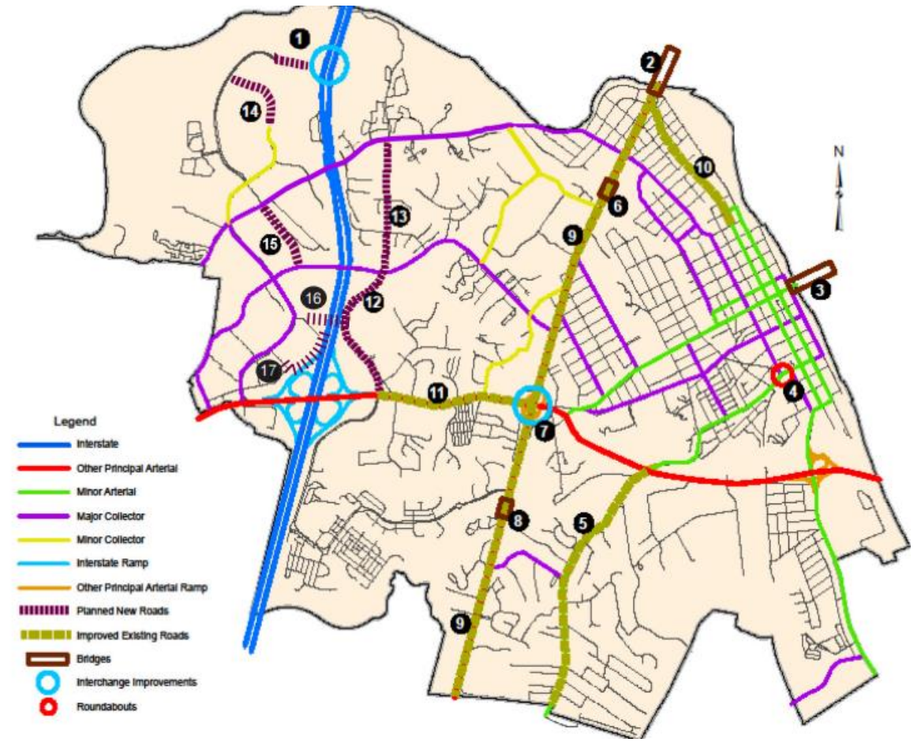


Figure 14: City of Fredericksburg Planned Improvements (Source: Virginia Comprehensive Plan, adopted by the Fredericksburg City Council, September 8, 2015, amended through January 25, 2022)

Spotsylvania County Transportation and Thoroughfare Plan

The Spotsylvania 2021 Transportation and Thoroughfare plan recommends the construction of a new interchange for I-95 at Harrison Road and the construction of sidewalks to fill in the gaps from the City of Fredericksburg line to Chewning Lane along Route 3. Sidewalks will be constructed as a requirement of any new developments along Route 3 where there are no existing ones and is not anticipated to be an exclusive and separately funded project.

Traffic Operations and Accessibility

Traffic operational analysis was performed using VISSIM, version 2022 software for all study intersections along the Route 3 corridor. Inputs and analysis methodologies are consistent with the VDOT Traffic Operations and Safety Analysis Manual (TOSAM) 2.0 guidelines and the VDOT VISSIM User Guide Version 2.0.

Traffic Data

JMT subconsultant, National Data and Surveying Services (NDS), collected 12-hour turning movement count data at all the study intersections on May 18, 2023, from 7:00 AM to 7:00 PM, and 72-hour volume data on the I-95 SB off ramp from May 16-18, 2023, that was used to develop the universal AM and PM peak hour volumes for the existing conditions. These counts were obtained while Spotsylvania County schools were still in session and include 15-minute intervals for cars, trucks, and pedestrians at each location. Based on further analysis, it was determined the universal peak hour for the corridor was 7:30 AM - 8:30 AM (AM Peak) and 4:30 PM – 5:30 PM (PM Peak). The raw traffic count data collected by NDS can be found in **Appendix A**.

Measures of Effectiveness

For the purposes of this study, guidance for reporting measures of effectiveness (MOE) for signalized and unsignalized intersections was obtained from Chapter 4 of the VDOT TOSAM 2.0. A summary of the MOEs evaluated for the study intersections is as follows:

- Control Delay (measured in seconds per vehicle – sec/veh)
- Level of service (LOS)
- Maximum Queue Length from VISSIM (measured in feet – ft)

LOS is a quantitative measure to characterize operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Letters designate each level, from A to F, with LOS A representing the best operating conditions and LOS F the worst. LOS is directly related to the control delay.

Existing Conditions VISSIM Model Calibration

JMT utilized VISSIM 2022 to model the existing conditions along the study area. The universal AM and PM peak hours were determined for the corridor and used as the basis for the volumes at each study intersection. VDOT provided Synchro files to be used as a basis for the existing signal timings along the corridor on June 20, 2023. JMT calibrated the existing conditions VISSIM model to best represent the field observed queue lengths at the signalized intersections.

Both the AM and PM models were calibrated using VDOT's TOSAM 2.0 thresholds as well as the VDOT VISSIM User Guide. Maximum queue lengths collected from field data were compared with the maximum queue lengths of the critical movements in the models. Critical movements are defined as any movement with heavy volume, most of which were the through movements on Route 3. The queue comparison thresholds for each movement were defined as the following:

- Queue lengths within +/- 20% for movements with a volume less than 100 vehicles per hour
- Queue lengths within +/- 15% for movement with a volume greater than 100 vehicles per hour but less than 1000 vehicles per hour
- Queue lengths within +/- 10% for movement with a volume greater than 1000 vehicles per hour but less than 5000 vehicles per hour

To meet the criteria set forth in VDOT's TOSAM 2.0, 85% of the total critical movements needed to be within the threshold to be considered fully calibrated. In the study corridor there are 18 critical movements for both the AM and the PM peak hours. Calibrating the existing conditions VISSIM models were an iterative process that involved changing several parameters to best match field observed conditions. It involved several trials and simulations to meet the desired criteria. The following VISSIM parameters related to driver and vehicle characteristics were adjusted to achieve the calibration thresholds:

- Speed and Acceleration
- Max Speed Difference
- Vehicle Routing Decision
- Standstill Difference
- Advanced Merging
- Slow Recovery
- Reaction time after Red Amber
- Desired Position at Free Flow
- General Behavior
- Observe Adjacent Lanes
- Safety Distance

After adjusting and calibrating the previously mentioned parameters, the simulated maximum queue lengths were compared to the maximum field observed values to determine if the model was properly

calibrated. This comparison was made for both the AM and PM peak hours. It was found that 17 of the 18 critical movements were calibrated in the AM, with the exception of the I-95 SB off ramp. The PM model was determined to have 15 of the 18 movements calibrated. It should be noted that while some of these critical movements do not meet the specific criteria, engineering judgement was used, and it was considered as calibrated. These occurrences where the criteria were not met, were mainly due to low queue lengths of less than 100 feet being observed in the field, making it extremely difficult to get within the exact threshold. In these instances, if the queue length was within 1-2 vehicles (~25-50 feet), the queue was considered to be calibrated.

Traffic Operations Analysis Results

The results of the existing conditions analysis show that three of the seven study intersections operate at an acceptable overall LOS D or better for both the AM and PM peak hours. The remaining four intersections all operate at very poor conditions (LOS E or LOS F) in the PM peak hour. These intersections with an overall poor LOS include:

- Route 3 at Bragg Road (LOS D in AM peak hour & LOS E in PM peak hour)
- Route 3 at Central Park Blvd./Mall Drive (LOS D in AM peak hour & LOS F in PM peak hour)
- Route 3 at Carl D Silver Pkwy./Mall Court (LOS D in AM peak hour & LOS F in PM peak hour)
- Route 3 at I-95 SB off ramp (LOS C in AM peak hour & LOS F in PM peak hour)

The MOEs for the AM and PM peak hour were extracted from the existing conditions VISSIM models and shown in ***Table 4.*** Any LOS that was reported as "D", "E", or "F" has been shown in the table as yellow, orange, or red, respectively. Additionally, any queue that was reported as longer than the existing storage length observed in the field has been highlighted in yellow.

Table 4: Existing Condition VISSIM, Analysis Results Summary (May 2023)

INTERSECTION #	ROADWAY	DIRECTION	LANE	STORAGE LANE (FEET)	EXISTING CONDITION					
					AM PEAK			PM PEAK		
					Delay (S/Veh)	LOS	Max Queue (ft)	Delay (S/Veh)	LOS	Max Queue (ft)
1 (SIGNALIZED)	Plank Road (Route 3)	Eastbound	L	280	87.8	F	576.2	203.5	F	550.1
			TH		12.6	B	576.2	19.4	B	550.1
			R	620	9.3	A	349.8	15.5	B	323.6
			Approach Delay							
		Westbound	L	280	220.9	F	220.3	137.4	F	1033.0
			TH		2.0	A	220.3	62.5	E	1033.0
			R	410	5.1	A	73.5	38.2	D	869.6
			Approach Delay							
	Taskforce Drive	Northbound	L	420	135.1	F	112.6	151.1	F	353.1
			THL		183.4	F	112.6	158.9	F	353.1
			R	270	11.0	B	139.3	53.9	D	379.8
			Approach Delay							
		Southbound	THL		89.6	F	66.8	157.3	F	227.7
			R	160	8.4	A	0.0	10.5	B	70.1
			Approach Delay							
	Overall Delay				**13.5**	**B**	**576.2**	**47.1**	**D**	**1033.0**
2 (SIGNALIZED)	Plank Road (Route 3)	Eastbound	L	320	71.2	E	615.4	123.6	F	496.2
			TH		21.5	C	615.4	35.1	D	496.2
			R	340	14.2	B	649.3	34.6	C	530.1
			Approach Delay							
		Westbound	L	365	245.8	F	421.8	104.5	F	1057.2
			TH		28.8	C	421.8	116.2	F	1057.2
			R	350	11.4	B	442.8	39.7	D	1078.1
			Approach Delay							
	Bragg Road	Northbound	L	160	109.8	F	198.3	102.9	F	330.6
			THL		147.2	F	198.3	130.5	F	330.6
			R		8.3	A	252.4	7.9	A	384.8
			Approach Delay							
		Southbound	L	250	104.9	F	193.7	173.3	F	529.6
			TH		94.5	F	193.7	246.3	F	529.6
			R	190	15.0	B	193.7	41.3	D	529.6
			Approach Delay							
	Overall Delay				**36.7**	**D**	**657.2**	**76.6**	**E**	**1078.1**
3 (SIGNALIZED)	Plank Road (Route 3)	Eastbound	L	290	103.4	F	793.6	101.1	F	1028.5
			TH		39.5	D	793.6	65.8	E	1028.5
			R	370	8.6	A	593.5	35.6	D	713.0
			Approach Delay							
		Westbound	L	390	205.5	F	474.9	123.9	F	973.1
			TH		8.2	A	474.9	297.4	F	973.1
			R		9.3	A	178.9	207.5	F	1025.2
			Approach Delay							
	Central Park Blvd / Spotsylvania Mall Dr	Northbound	L		200.4	F	114.6	143.6	F	191.2
			THL		283.2	F	114.6	76.5	E	191.2
			R		4.4	A	0.0	2.8	A	3.4
			Approach Delay							
		Southbound	L	200	191.0	F	79.2	106.9	F	510.1
			THL		294.0	F	79.2	130.7	F	510.1
			R	200	6.0	A	94.1	154.6	F	525.0
			Approach Delay							
	Overall Delay				**39.4**	**D**	**826.2**	**130.8**	**F**	**1040.0**

Table 4: Existing Condition VISSIM, Analysis Results Summary (May 2023) (cont.)

INTERSECTION #	ROADWAY	DIRECTION	LANE	STORAGE LANE (FEET)	EXISTING CONDITION					
					AM PEAK			PM PEAK		
					Delay (S/Veh)	LOS	Max Queue (ft)	Delay (S/Veh)	LOS	Max Queue (ft)
4 (SIGNALIZED)	Plank Road (Route 3)	Eastbound	L	120	220.2	F	944.7	197.0	F	702.7
			TH		28.9	C	944.7	14.4	B	702.7
			R	145	16.3	B	944.7	5.8	A	702.7
			Approach Delay							
		Westbound	L	310	779.2	F	796.3	254.0	F	1125.0
			TH		29.3	C	796.3	255.5	F	1125.0
			R	560	22.1	C	796.3	138.5	F	1125.0
			Approach Delay							
	Carl D Silver Parkway	Southbound	L		138.5	F	239.9	112.1	F	834.1
			THL		142.5	F	239.9	143.7	F	834.1
			R	170	10.8	B	83.4	411.7	F	883.0
			Approach Delay							
		Northbound	THL		90.2	F	65.3	86.3	F	61.2
			R		14.0	B	84.1	12.2	B	80.1
			Approach Delay							
	Overall Delay				**39.8**	**D**	**974.1**	**117.4**	**F**	**1231.6**
5 (SIGNALIZED)	Plank Road (Route 3)	Westbound	TH	40	14.3	B	308.6	228.7	F	698.8
	I-95 SB Off Ramp	Southbound	R	40	65.1	E	592.2	225.3	F	1658.2
	Overall Delay				**34.2**	**C**	**592.2**	**227.1**	**F**	**1658.2**
6 (UNSIGNALIZED)	Bragg Road	Northbound	L		0.9	A	0.0	1.8	A	0.0
			TH		0.1	A	0.0	0.2	A	0.0
			R		0.5	A	0.0	0.5	A	0.0
		Southbound	L	320	0.9	A	30.2	2.1	A	101.5
			TH		0.1	A	0.0	0.3	A	40.6
			R		0.5	A	0.0	0.8	A	40.6
	Spotsylvania Mall Drive	Eastbound	L		7.4	A	50.3	8.9	A	48.6
			TH		9.3	A	50.6	10.9	B	48.9
			R		8.5	A	49.2	9.0	A	47.5
		Westbound	L		5.5	A	40.9	8.6	A	83.2
			TH		0.0	A	42.0	2.5	A	84.3
			R	230	5.6	A	68.7	8.0	A	134.5
	Overall Delay				**1.5**	**A**	**70.2**	**2.6**	**A**	**140.6**
7 (UNSIGNALIZED)	Spotsylvania Mall Drive	Northbound	R		0.8	A	22.3	4.9	A	61.0
			TH		0.9	A	22.3	2.5	A	61.0
			U		0.3	A	22.3	2.4	A	61.0
		Southbound	L		1.4	A	21.4	4.9	A	103.6
			TH		1.8	A	21.4	5.1	A	103.6
			U		1.3	A	21.4	3.2	A	103.6
	Towne Center Blvd	Westbound	L		1.5	A	8.1	7.6	A	80.6
			R		1.9	A	8.1	6.5	A	80.6
			U		0.0	A	8.1	4.5	A	80.6
	Overall Delay				**1.3**	**A**	**24.3**	**4.7**	**A**	**106.0**

Pedestrian and Bicycle Access

JMT reviewed the existing conditions of pedestrian and bicycle facilities along the corridor. Route 3 has no pedestrian or bicycle accommodations on the corridor apart from the Northeast quadrant of the intersection of Route 3 at Bragg Road, as shown in ***Figure 15.*** Both Carl D Silver Parkway and Central Park Boulevard were observed to have sidewalks along their respective roadways, but these sidewalks ended at each of their intersections with Commerce Street. There was no continuation of the sidewalks from Commerce Street down to Route 3. There are recommended pedestrian access improvements discussed in the ***Potential Corridor Improvements*** section.

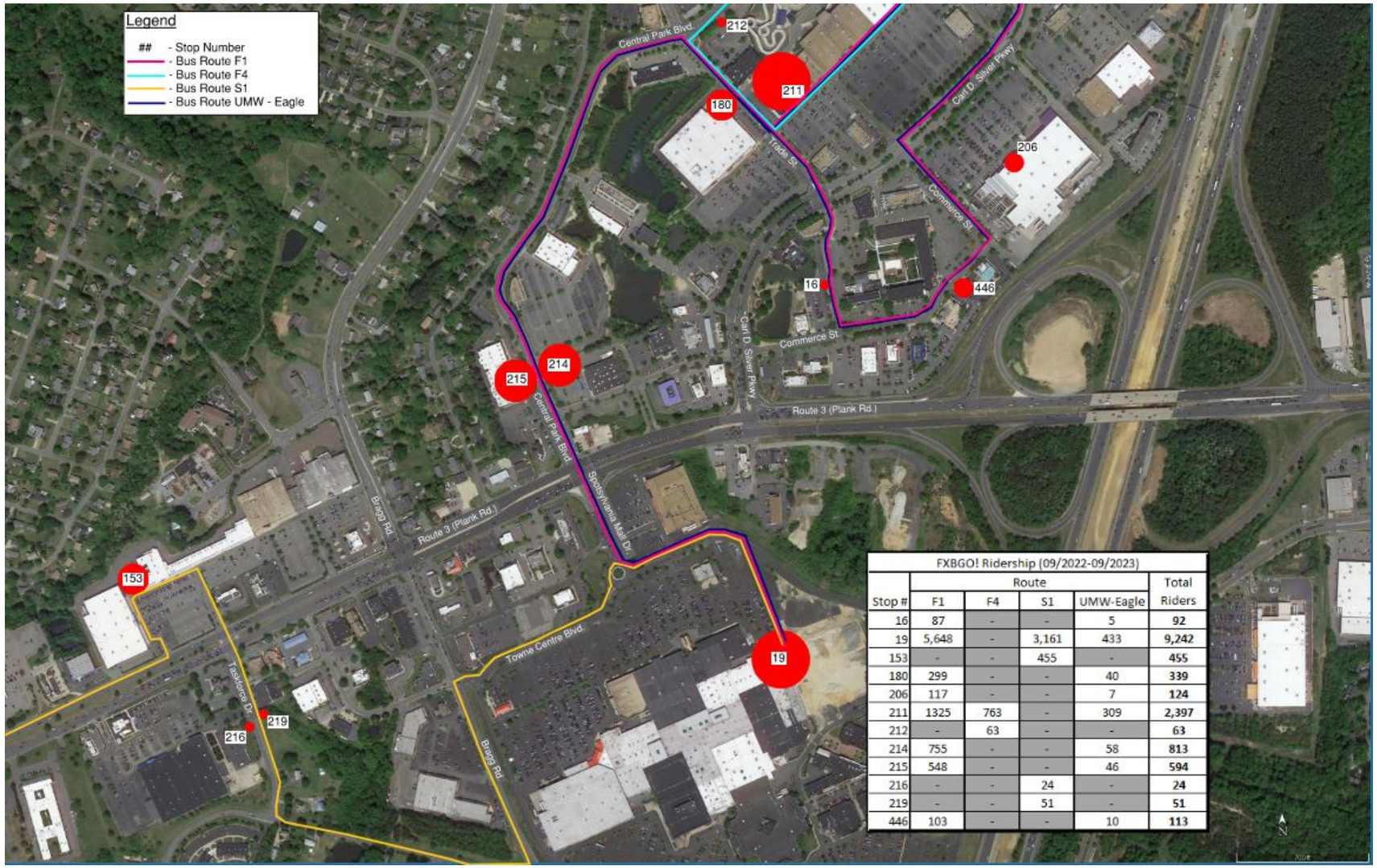
Figure 15: Existing Pedestrian Facilities at Route 3 at Bragg Rd. (Source: Google Earth 2023)

Existing Transit

The area surrounding the study corridor has several Fredericksburg Regional Transit (FXBGO!) bus stops available to citizens as seen in ***Figure 16***. JMT observed that there was little to no accommodation at most of the stops in the vicinity. As shown in ***Figure 17*** and ***Figure 18***, most stops were denoted by a single bus stop sign and had no sidewalk or nearby bench. There were few riders that were observed utilizing the stops or the bus as it came through on its route. One of the observed FXBGO! stops (#19 – Spotsylvania Towne Centre) has a bus shelter that was being utilized during the field visit. This can be observed in ***Figure 19***.

FXBGO! provided ridership data for the four routes that currently operate directly adjacent to the study corridor. The ridership data was collected from September 19, 2022, to September 19, 2023. It should be noted that there is currently no ridership fee for riders on these routes, as FXBGO! Was awarded the "Fare Free Trip" grant that started on February 28, 2022. This grant is anticipated to be in effect for four years from the beginning date.

As detailed in ***Figure 16,*** the most used bus stop over a one-year period was the bus stop located at Spotsylvania Towne Center (9,242 riders) followed by the bus stop located at the Barnes and Noble on Trade Street. Both locations include some kind of accommodation for riders and have three routes using that particular stop. The stop at Spotsylvania Towne Center has the bus shelter shown in ***Figure 19*** and the stop located at Barnes and Noble (Stop #211) has a bench located near the stop.



FXBGO! Ridership (09/2022-09/2023)

Stop #	Route F1	Route F4	Route S1	Route UMW-Eagle	Total Riders
16	87	-	-	5	**92**
19	5,648	-	3,161	433	**9,242**
153	-	-	455	-	**455**
180	299	-	-	40	**339**
206	117	-	-	7	**124**
211	1325	763	-	309	**2,397**
212	-	63	-	-	**63**
214	755	-	-	58	**813**
215	548	-	-	46	**594**
216	-	-	24	-	**24**
219	-	-	51	-	**51**
446	103	-	-	10	**113**

Figure 16: FXBGO! Bus Routes and Ridership Information

Figure 17: Stop #219 – Task Force Drive (Photo captured July 2023

Figure 18: Stop #180 – Trade Street (Photo captured July 2023)

Figure 19: Stop #19 – Spotsylvania Towne Centre Bus Shelter (Photo captured July 2023)

Access Management

There is a total of 42 access points located within the study area, as shown in ***Figure 20***. Access points are defined as median crossovers, driveways, or any entrance that allows vehicles to enter or exit the roadway. Along the 0.87-mile section of Route 3, there are 21 access points: nine in the eastbound direction and 12 in the westbound direction for an average of 10.4 and 13.8 access points per mile, respectively. The side streets of Route 3 had significantly higher access points per mile compared to the main corridor, largely due to the high number of parking lots and aisles for various shopping complexes. There is a total of seven access points along the 0.13-mile segment of the southern leg of Bragg Road, three on the northbound side and four on the southbound side. Spotsylvania Mall Drive/Town Centre Boulevard has the highest number of access points with 14 total, eight of which consist of parking lot aisles to the shopping complex south of the roadway.

Figure 20: Study Corridor Access Points

Several of the access points are very close to an intersection or located within a storage lane. Most of the access points in the eastbound direction of Route 3 occur in areas that are striped as right-turn lanes. Based on the crash analysis (discussed further in this chapter) there are several angle crashes that occur near these access points. There were 22 angle crashes from 2017 to 2022 that occurred in the eastbound direction of Route 3 directly in front of these access points. The westbound direction of Route 3 had 10 of the 12 access points in a designated storage lane or within 100 feet of an intersection. There is a total of 19 angle crashes that occurred in proximity to the access points. While further analysis is needed to determine the cause of these crashes, it seems there is a correlation between the location of angle crashes and access points on Route 3. To address this, several access points are recommended to be closed in the ***Potential Corridor Improvements*** section.

STEAP Analysis

A screening tool for equity analysis of projects (STEAP) report was developed for the Route 3 corridor within the study limits. This tool provides estimates of the socioeconomic characteristics of the population surrounding a project location. The statistical categories reported relate to race, ethnicity, age, sex, household size and income, and household vehicle ownership. This analysis helps to identify disadvantaged population size and characteristics, to determine if any accommodation needs to be provided in any of the proposed alternatives. The data source used for the analysis was the American Community Survey 2016 – 2020 and a 0.5-mile radius was used for the analysis buffer size. The general demographic of the project location with a 0.5-mile buffer size compared to Spotsylvania County and the state of Virginia is presented in ***Table 5.*** A map showing the depicted buffer size coverage around the study corridor is presented in ***Figure 21.***

Table 5: STEAP Analysis Area Statistics

General Buffer Area Statistics	Estimates		
	0.5-mile	Spotsylvania County	Virginia
Land Area (in square miles)	2	401	39,482
Population	2,237	134,683	8,509,358
Housing Units	813	48,522	3,537,788
Households	767	45,463	3,184,121
Families	513	34,302	2,103,100

The results of the STEAP tool analysis are presented below:

- Most of the population (63%) within the study area is between ages 18 and 64, as shown in ***Figure 22***, which is similar to Spotsylvania County and the state of Virginia.
- In the 0.5-mile buffer size of the project location, most of the households (41%) own two vehicles, like in Spotsylvania County and the state of Virginia. Four percent of households in the 0.5-mile buffer size of the project location do not own a personal vehicle, as shown in ***Figure 23***.
- Of the non-English speakers (age 5+) at home, only 2% of the population within the 0.5-mile buffer size do not speak English well, similar to Spotsylvania County and the state of Virginia, as shown in ***Figure 24***. Everyone speaks at least a little English within the 0.5-mile buffer size of the project location.
- The household income result shows 57% have household income greater than $75,000, as shown in ***Figure 25***.
- When compared to Spotsylvania County, the study area has a lower average number of veterans, households with no computers, and households without internet connection, as shown in ***Figure 26.*** Only the number of people with disabilities is higher in the study area than in the County.

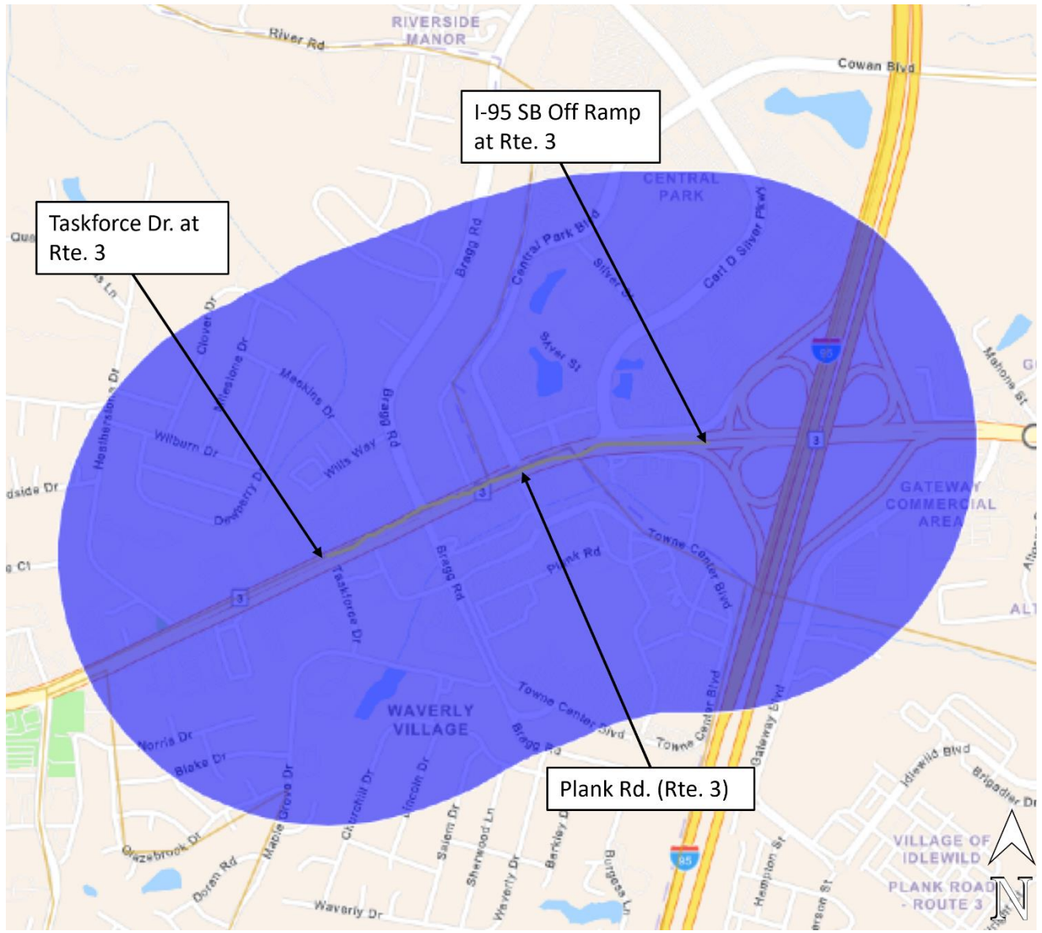


Figure 21: STEAP Analysis 0.5-Mile Buffer Size

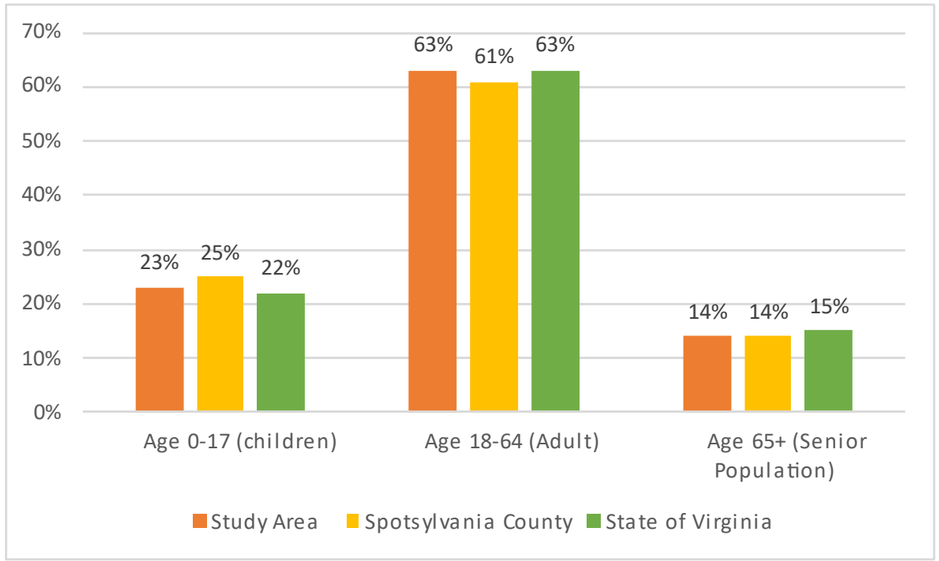


Figure 22: STEAP Analysis Result of Population by Age

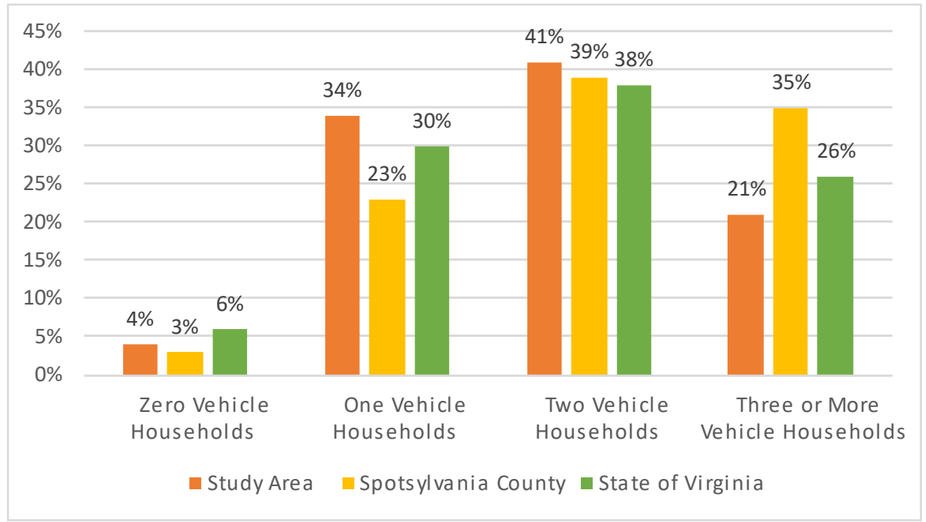


Figure 23: STEAP Analysis Result of Vehicle Ownership

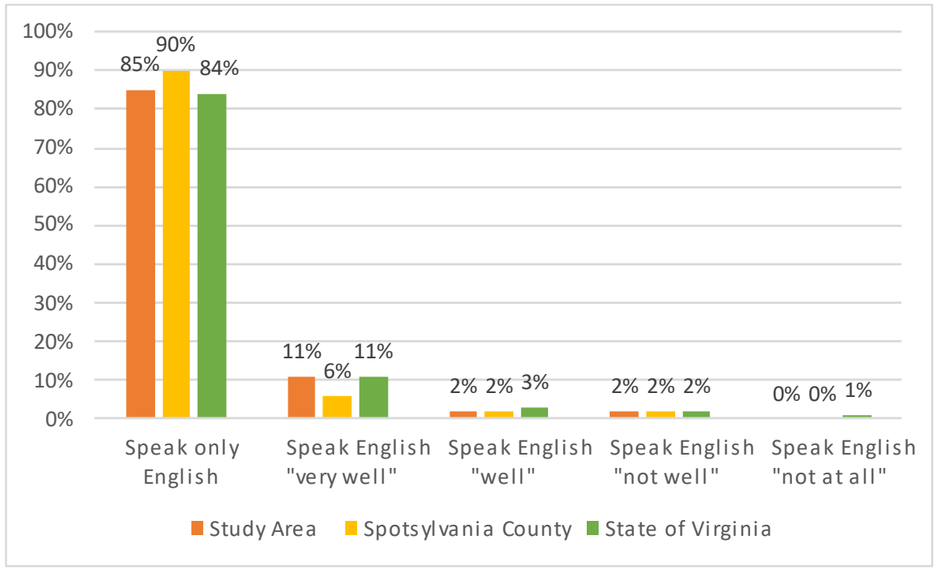


Figure 24: STEAP Analysis Result of Population Age 5+ Years by Ability to Speak English

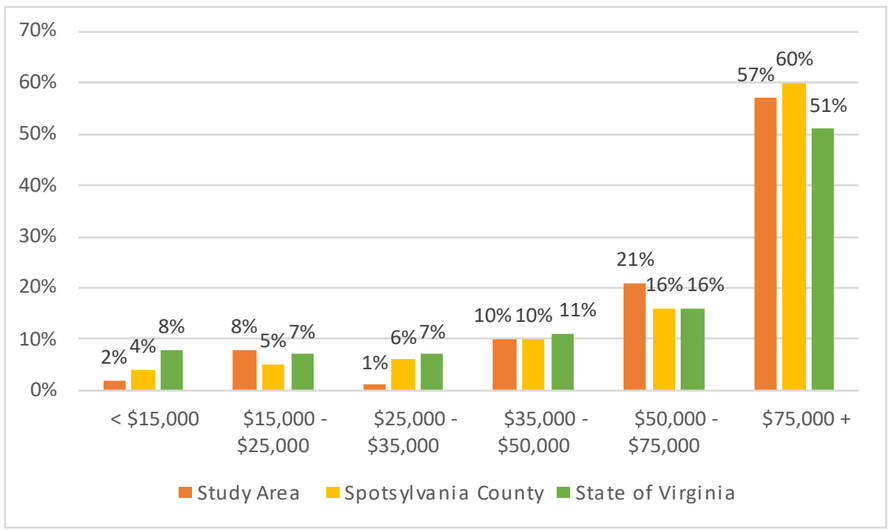


Figure 25: STEAP Analysis Result of Household Income

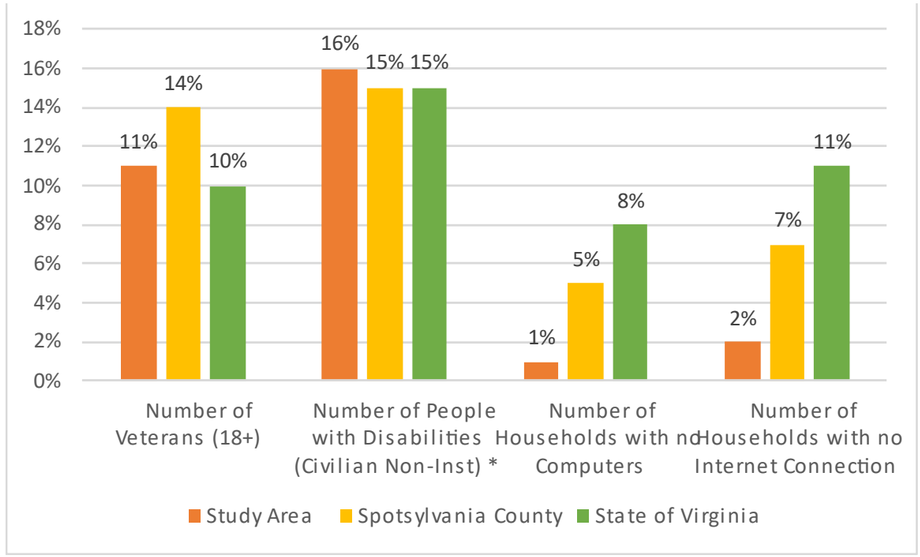


Figure 26: STEAP Analysis Result of Other Vulnerable Populations

Field Review

JMT conducted a field visit on Wednesday July 12, 2023, to observe existing conditions and collect data during the universal AM and PM peak hours. Road geometry, lane configurations, signing and pavement marking, travel pattern, pedestrian and bicycle facilities, nearby transit, and sight distances were collected throughout the day. Signal operations, queue lengths, and travel patterns at all approaches of the study signalized intersections along the study corridor were observed during the universal AM and PM peak hours.

Some of JMT's additional observations while in the field included witnessing the cleanup of a rear-end collision, viewing aggressive driving behaviors (honking, disregard of traffic signals and signing, tailgating), and ineffective lane use of the roundabout travel lanes. The intersection specific observations are discussed in the following sections.

Carl D Silver Parkway/Mall Court

During the field visit, JMT observed that many of the vehicles that used the I-95 slip ramp ignored the red light at the signal, which stated that vehicles need to stop on red. Additionally JMT observed some

Figure 27: Carl D Silver Parkway (Looking south; Photo captured July 2023)

issues and difficulties with vehicles taking the slip lane and then trying to merge over to the left-turn lane that leads to the WAWA site entrance on Carl D Silver Parkway and causing some weaving issues. Additionally, the queues on the southbound approach of Carl D Silver Parkway have four lanes, three of which have pavement markings directing vehicles based on final destination (I-95 North, I-95 South, Rte. 3 East) as shown in ***Figure 27.*** However, due to long queues cars appeared to often not be able to be in the correct lane and ultimately had to merge and weave into the correct lane a short distance after making the left turn onto Rte. 3.

Central Park Boulevard/Mall Drive

JMT noticed that as you travel south on Central Park Boulevard and cross over Route 3 towards Spotsylvania Mall Drive, the alignment for the through movement of the shared through-left lane

seems to guide the vehicle toward the receiving lane for the exclusive southbound through lane, which is not the correct receiving lane.

Bragg Road

JMT observed ongoing construction in the northeast corner of the intersection of Route 3 at Bragg Road. The building previously located at this corner was demolished and there was a construction crew that was working on removing the pavement and/or foundation. On the northwest quadrant of the intersection, JMT observed a pedestrian sidewalk and multiple utility markings on the sidewalk and surrounding grass area.

Taskforce Drive

At Taskforce Drive and Route 3, JMT observed low traffic on both northbound and southbound approaches of the minor street during the AM and PM peak periods. The approach with heavier volume appeared to be the northbound one. JMT observed the FXBGO! Transit bus travels northbound at this intersection on its route to the stop that is located near the “At Home” store. At the time of the observation, it appeared that there was one rider on the bus and no one waiting at the next bus stop. There were utilities marked with flags and paint on the northeast quadrant of the intersection near the overhead utility pole as shown in ***Figure 28***.

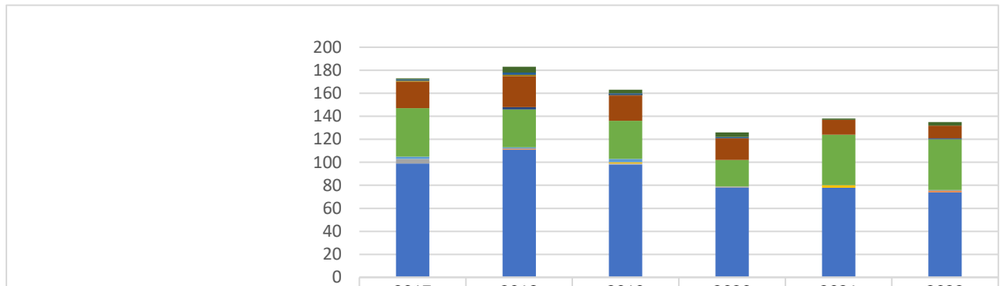
Figure 28: Taskforce Drive Utilities in the Northeast Quadrant (Photo captured July 2023)

Safety and Reliability

A crash analysis was conducted for the study corridor along Route 3 (Plank Rd) between Taskforce Dr. and the I-95 SB off ramp. Crash data was collected from VDOT ArcGIS Crash Map, as well as the Project Pipeline Dashboard for a six-year period, between January 1, 2017, and December 31, 2022. A six-year period was used in place of the standard five-year period to more accurately encompass the years affected by the COVID pandemic (2020), and to increase the sample size of years unaffected by the pandemic.

Safety Analysis Results

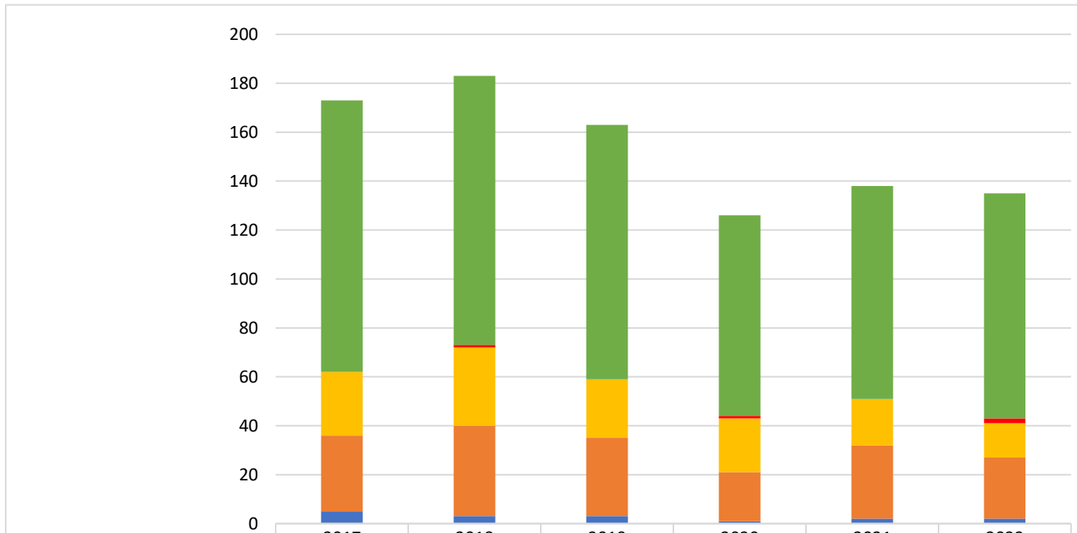
A review of the data showed a total of 918 crashes along the segment over the six-year period. ***Figure 29*** shows a breakdown of crashes by type, which were predominantly rear end (538, 59%), angle (219, 24%), and sideswipe-same direction (115, 12%). All other crash types account for 46 crashes, or about 5% of the crashes along the corridor.



	2017	2018	2019	2020	2021	2022
9. Fixed Object - Off Road	1	5	3	4	1	3
8. Non-Collision	1	2	1	1		
6. Fixed Object in Road	1	1				
5. Sideswipe - Opposite Direction			1			
4. Sideswipe - Same Direction	23	27	22	19	13	11
3. Head On		2				1
2. Angle	42	33	33	23	44	44
16. Other	2	1	3			
15. Backed Into			1		2	
12. Ped	4		1	1		1
10. Deer		1				1
1. Rear End	99	111	98	78	78	74

Figure 29: Crash Types by Year

Figure 30 shows crash severity by year. The crash data is categorized as K: Fatal injury, A: Serious Injury, B: Visible Injury, C: Nonvisible Injury, and PDO: Property Damage Only. Most crashes along the corridor were property damage only (586, 64%), followed by visible injury (175, 19%), and nonvisible injury (137, 15%). Four crashes were identified as fatal. Of those fatalities, two occurred near the intersection of Bragg Road, one occurred just to the west of the intersection with Spotsylvania Mall Drive, and one occurred between Carl D Silver Parkway and Spotsylvania Mall Drive in the westbound direction. Two of the fatalities were related to speed, one was a pedestrian crossing Route 3 in the middle of the block at a location without a crosswalk, and one occurred due to a driver disregarding the traffic signal.



	2017	2018	2019	2020	2021	2022
PDO. Property Damage Only	111	110	104	82	87	92
K. Fatal Injury		1		1		2
C. Nonvisible Injury	26	32	24	22	19	14
B. Visible Injury	31	37	32	20	30	25
A. Severe Injury	5	3	3	1	2	2

Figure 30: Crashe Severity by Year

The crash history was also sorted by environmental factors, including lighting conditions, weather, and roadway surface conditions. Crashes are categorized as occurring under “normal conditions” if they

occurred during daylight conditions, under clear weather conditions (no rain/snow/sleet), and it occurred when the roadway surface was dry.

As ***Table 6*** shows, 64% of all crashes occurred under normal conditions. 72% of crashes occurred under daylight conditions, 89% under clear weather, and 87% on dry pavement. Crash Rates were calculated for each intersection based on available crash data, and AADT obtained from VDOT published records. The average intersection crash rate for all Spotsylvania County roadways above 20,000 AADT is 0.37 crashes per million entering vehicles (MEV).

Table 6: Crashes by Environmental Factors

Route 3 2017-2022 Crash Data																				
	Lighting						Weather					Surface						Total		
Crash Type	2. Daylight	1. Dawn	3. Dusk	4. Darkness - Road Lighted	5. Darkness - Road Not Lighted	6. Darkness - Unknown Road Lighting	1. No Adverse Condition (Clear/Cloudy)	3. Fog	4. Mist	5. Rain	6. Snow	1. Dry	2. Wet	3. Snowy	4. Icy	6. Oil/Other Fluids	7. Other	Number	%	
1. Rear End	391	10	20	78	39	0	471	0	5	59	3	465	69	2	1	0	1	538	59%	82%
2. Angle	167	2	5	30	14	1	199	0	0	18	1	195	22	0	1	0	0	219	24%	
3. Head On	1	1	0	1	0	0	3	0	0	0	0	2	1	0	0	0	0	3	0%	
4. Sideswipe - Same Direction	83	1	3	18	10	0	105	0	2	8	0	102	13	0	0	0	0	115	13%	
5. Sideswipe - Opposite Direction	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	1	0%	
6. Fixed Object in Road	0	0	0	1	1	0	2	0	0	0	0	2	0	0	0	0	0	2	0%	
8. Non-Collision	2	0	1	1	1	0	4	0	0	1	0	4	1	0	0	0	0	5	1%	
9. Fixed Object - Off Road	9	0	2	2	4	0	15	0	0	2	0	13	4	0	0	0	0	17	2%	18%
10. Deer	0	1	0	0	1	0	2	0	0	0	0	2	0	0	0	0	0	2	0%	
12. Ped	2	0	0	4	1	0	5	0	0	2	0	5	2	0	0	0	0	7	1%	
15. Backed Into	1	0	0	2	0	0	1	0	0	2	0	1	2	0	0	0	0	3	0%	
16. Other	3	0	0	3	0	0	5	0	0	1	0	5	1	0	0	0	0	6	1%	
Total Frequency	659	15	31	140	72	1	813	0	7	93	4	797	115	2	2	0	1	918		
Total(%)	72%	2%	3%	15%	8%	0%	89%	0%	1%	10%	0%	87%	13%	0%	0%	0%	0%			
				28%					11%						13%					
% of Crashes occurred during a combination of daylight, clear weather, and dry surface conditions							586 64%													

This average rate was used for comparison with the study intersections. Six of the seven study intersections had a higher crash rate than the County average. Carl D Silver Pkwy. had a particularly high rate of 2.6 crashes per MEV (~450 of the 987 crashes included in the study period). The remaining intersections that were above the County's average rate had crash rates between 0.73 and 0.95 (Route 3 at I-95 SB off ramp, Central Park Entrance, Bragg Road, Taskforce Drive, and Bragg Road at Town Center Boulevard). Most crashes along the corridor are associated with an intersection, most prominently Carl D Silver Parkway, with 450 crashes during our study period. The Spotsylvania Mall Drive intersection had 152 crashes, Bragg Road had 203, and Taskforce Drive had 134, making up a large portion of the remaining crashes.

Corridor crash rates were also determined utilizing VDOT's Tableau Crash data and determined to be 124.24 crashes per 100 million vehicle miles traveled for VDOT's Fredericksburg District in 2019. VDOT's Fredericksburg District's 2020 crash rate was determined to be 117.3. For comparison purposes, JMT utilized the higher of the two rates due to the potential effects of the COVID pandemic on data in the year 2020. The crash rate was also determined for the Fredericksburg District on similar roadway functional classification types (Urban Other Principal Arterials). The corridor crash rate for similar roadways within the Fredericksburg district was determined to be 193.39. The Route 3 study corridor crash rate for 2021 was determined to be 667, approximately five times the district average and 3.5 times the district average for similar roadways. The corridor crash rate for the study corridor included all crashes collected in our data range that occurred on Route 3. ***Figure 31*** shows a heat map of corridor crash density.

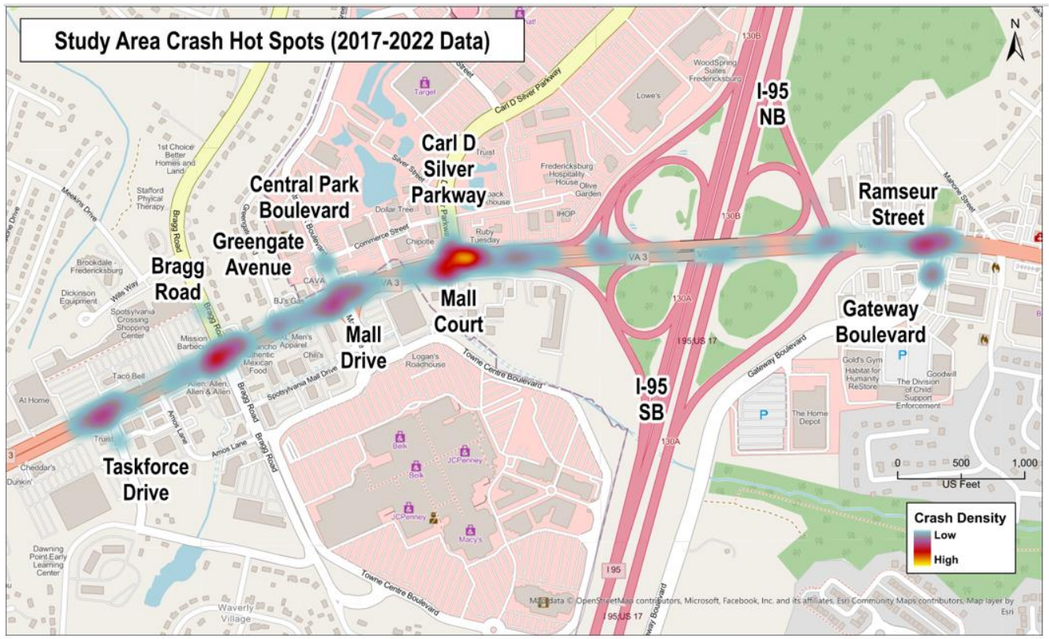


Figure 31: Crash Density Heap Map

Field observations of the study corridor included significant queuing along Route 3, especially in the PM peak hour where queues would back up along the entire corridor from Taskforce Drive to I-95. These significant queues are likely a large contributing factor in the significant portion of rear end crashes seen in the crash data used for this analysis.

Drivers were also observed to display aggressive behavior, with several drivers honking just seconds after a light turning green, ignoring stop signs, running red lights, and not stopping for the "Right-turn on red after stop" sign from the I-95 Slip Ramp to Carl D Silver Parkway. This behavior likely contributes to the significant number of angle crashes, as well as the sideswipe crashes from aggressive weaving.

Anticipated Corridor Issues

Based on the available crash data and the observations made in the field, the predominant cause of issues along this corridor is the significant traffic volume present during peak hours, and the congestion it creates. The westbound traffic along Route 3 fully queues the segments between intersections, with the backups beginning west of the study corridor. As a result of the congestion throughout the corridor, rear end collisions are by far the predominant crash type.

Potential Corridor Improvements

Pedestrian and Bicycle Improvements

The study area along Route 3 currently has very limited pedestrian facilities, outside of a minor portion of sidewalk along the westbound direction of Route 3, and no bicycle facilities. VTrans lists the needs of Bicycle Access, Pedestrian Access, and Pedestrian Safety Improvement as VERY HIGH. To help accommodate these needs, a sidewalk in both the eastbound and westbound direction of Route 3 is recommended, as shown in ***Figure 32***. Along with this sidewalk, crosswalks are recommended to be added at each signalized intersection. These improvements will help promote the use of walking/bicycling while providing safer access for the users. During the study work group (SWG) meeting held on September 19, 2023, it was discussed that there is a shared use path proposed in the FAMPO East-West mobility study that is preferred by the City over parallel sidewalks along Route 3. Additionally, during the SWG meeting it was determined that sidewalk infill along Route 3 has already been adopted and will be required along for any new or re-developed parcels. As such the County recommended not constructing a shared use path along Route 3. There were also safety concerns brought up from multiple stakeholders with having pedestrian facilities running parallel to the heavily traveled Route 3 corridor.

Access Management Improvements

As discussed in the access management section of this report, several of the access points along Route 3 are either near an intersection or located within a storage lane. Many crashes have occurred near these access points. Several of these access points have multiple entrances located on the minor roadway with another access point on the main corridor. It is recommended to close access points along Route 3 that have another entrance on a minor roadway and have a correlation to crashes on Route 3.

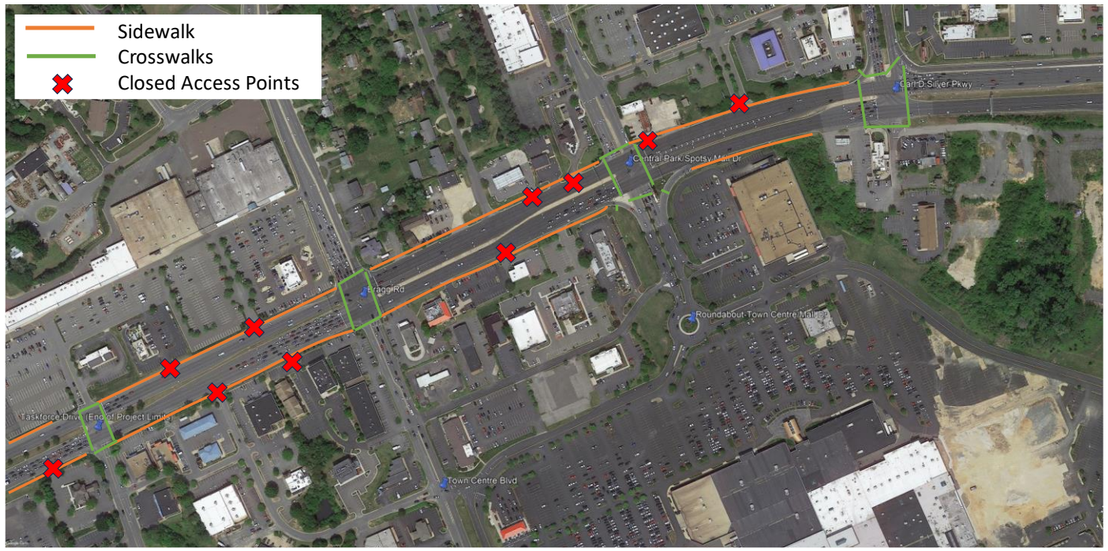


Figure 32: Proposed Pedestrian, Bicycle, & Access Management Corridor Improvements

Transit Facilities Improvements

There are several bus stops located along the Route 3 corridor, however, there are very few facilities to promote ridership. Adding sidewalks, along with benches or overhead shelters may enhance the safety for current riders, while encouraging the use of transit facilities by those not currently utilizing it.

General Corridor Recommended Improvements

1. Restrict U-turns at select movements: not allowing U-turns will improve safety and traffic operations at the intersections. During the SWG meeting held on September 19, 2023, VDOT expressed concerns about the restriction of U-turn movements along this corridor.

2. Signal Optimization: with the proposed alternatives presented on the subsequent pages, several of the intersections will undergo lane reconfigurations. The signal timing plans within the study corridor should be reoptimized for additional efficiency.

Taskforce Drive

1. Conversion of the westbound right-turn lane into a shared through-right lane (see ***Figure 33***): Due to the high through volume in both directions during the peak hour, an additional through lane will help relieve some of the existing capacity issues. During the SWG meeting held on September 19, 2023, it was conveyed that the eastbound shared through-right lane is operating under existing conditions.
2. Conversion of northbound shared though-left lane into a dual left and a shared through-right lane (see ***Figure 33***): due to the high left-turn volume in the PM peak hour, the change in lane configuration will change the phasing in the northbound/southbound direction from split phasing to a protected left-turn, creating more time for this movement.
3. Conversion of southbound shared through-left lane into an exclusive left-turn with a shared through-right lane (see ***Figure 33):*** Like the northbound direction, the phasing will be changed from split to protected for the left-turn movement creating more time and less delay issues.
4. During the SWG meeting held on September 19, 2023, stakeholders recommended the study team to review the potential for utilizing the thru-cut innovative intersection which would eliminate the northbound and southbound through movements. This would optimize the signal operation and potentially alleviate some of the congestion that occurs along Route 3.

Figure 33: Taskforce Drive Improvements #1, #2 and #3

Bragg Road - Alternative 1

- Conversion of westbound right-turn lane into shared through-right lane, as shown in ***Figure 34.*** Like Taskforce Drive, due to the high through volume in both directions during the peak hour, an additional through lane will help relieve capacity issues. During the SWG meeting held on September 19, 2023, it was conveyed that the eastbound shared through-right lane is operating under existing conditions and the westbound shared through right-lane will be constructed as part of the Route 3 operational improvements project discussed in the “Background Studies, Projects, Planning Documents” section of this document.

Figure 34: Bragg Road Alternative 1 Improvements

Bragg Road - Alternative 2

- Center Turn Overpass at Bragg Road: The left turns at Bragg Road and Route 3 would be elevated away from the main intersection using ramps creating two separate signals, one for the through and right movements, the other exclusively for left turns, a concept of which is shown in ***Figure 35***. Each intersection would operate like a conventional intersection. This approach at each intersection would reduce the number of conflict points for crashes as well as improve delay and queueing.

Figure 35: Bragg Road Alternative 2 Improvements Concept image of Elevated Center Turn Overpass (Source: VDOT website)

Central Park Boulevard/ Mall Drive

- Elimination of westbound left turns: All westbound left turning vehicles would be combined with the through movement and perform their left turn at the downstream intersection of Route 3 & Bragg Road, as shown in ***Figure 36***. They would then be able to turn left into the shopping plaza/retail area at the unsignalized intersection of Bragg Road & Town Centre Boulevard.

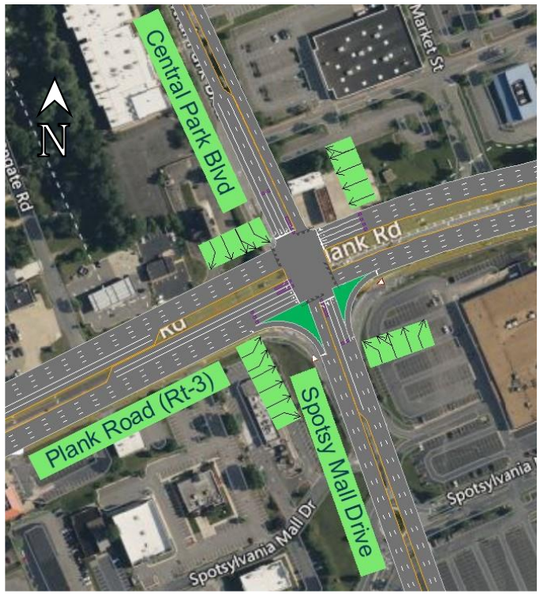


Figure 36: Spotsylvania Mall Drive Restricted Westbound Left Turns

Carl D Silver Parkway - Alternative 1

- Conversion of southbound through/left lane into a triple left with a shared through-right lane: Due to over 700 vehicles turning left from the southbound direction in the PM peak hour, a triple left without a shared lane is necessary to help with queueing and delay. The right lane would still be channelized; however, it would be shared with the through movement, as shown in ***Figure 37.***

- Removal of northbound shared through-left lane into an exclusive left lane (Thru-Cut): This alternative eliminates the through movement from the northbound direction and combines those vehicles with the northbound lefts. They would then proceed to turn right at Central Park Boulevard.

- Dual Westbound right-turn slip lane going northbound on Carl D Silver Parkway: In the PM, over 700 vehicles are using the slip lane from the I-95 SB off ramp to go north on Carl D Silver Parkway. This is causing significant queuing and operational issues. A dual channelized right-turn slip lane, which is stop controlled, is expected to drastically help with queueing and prevent cars from backing up into the off ramp. There would still be a right-turn lane in the westbound direction allowing vehicles not coming off the I-95 SB off ramp to still turn right. During the SWG meeting held on September 19, 2023, stakeholders recommended that this dual slip-lane alternative should be proposed as signalized as opposed to stop-controlled. It was also discussed that this may cause some conflicts with the existing dual eastbound left-turns on Route 3, as the slip lanes would require two receiving lanes. Additionally, stakeholders expressed that if this alternative moves forward that the solutions for the existing weaving issues for traffic on Carl D Silver Parkway be mitigated in some way.

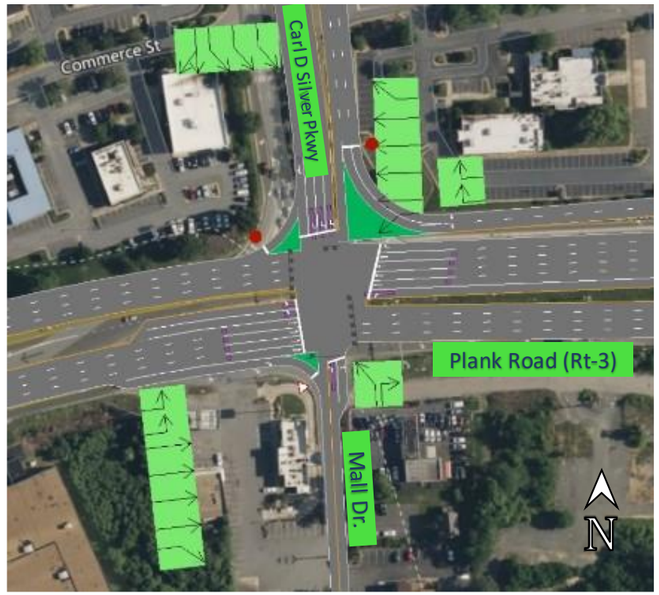


Figure 37: Carl D Silver Pkwy. Alternative 1 Improvements

Carl D Silver Parkway - Alternative 2

- Connection of Mall Court with Spotsylvania Mall Drive: this alternative would connect Mall Court with Spotsylvania Mall Drive just east of the Econo Lodge at Spotsylvania Town Center (see ***Figure 38***). This connection would help alleviate the high volume of vehicles entering/exiting the mall at Central Park Boulevard/Spotsylvania Mall Drive. The northbound traffic on Mall court is proposed to be a right-out only with dual right-turn lanes exiting onto Route 3 eastbound and there would be dual left-turn lanes in the westbound direction. During the SWG meeting held on September 19, 2023, multiple stakeholders inquired about the feasibility of combining this

alternative with a flyover ramp proposed in the previous project pipeline study for this corridor (FR01).

Figure 38: Carl D Silver Pkwy. Alternative 2 Improvements (Source: FR01 Project Pipeline Report 12/13/2023)

Grade Separated Roadway

- A grade separated roadway would divide the through traffic on Route 3 with the side street traffic including the left and right movements from Route 3. All vehicles traveling the full corridor starting at Carl D Silver Parkway continuing to the end of the study area of Taskforce Drive would be free flow while the grade separated corridor would operate as a conventional intersection. Further analysis would be needed to determine the feasibility, however, a concept sketch of what the corridor could potentially look like is presented in ***Figure 39.***

Figure 39: Grade Separated Roadway Concept Along Route 3 (Source: FR01 Project Pipeline Report 12/13/2023)

Park and Ride/Transit/Rail

To increase public transit, it is recommended to add a Park & Ride west of the corridor with access to transit to/from the rail station of Virginia Railway Express (VRE) – travelling north. During the September 19, 2023, SWG meeting, it was brought to attention that there is the Old Salem Church Road Park and Ride lot to the west of the corridor and a commuter lot located in the southwest quadrant of the Route 3 intersection with Gordon Road. Stakeholders stated that the FXBGO! transit previously had bus routes that traveled from these areas and that there is a plan in place to resume that bus route.

Chapter 2:

Alternative Development and Refinement

Future Analysis

Future Traffic Forecasting

Annual growths rates of 1.5% and 2% were provided by VDOT to calculate future volumes for Route 3 and the side streets, respectively. These growth rates were applied linearly to the existing AM and PM peak hour traffic volumes to calculate expected future volumes for the opening year (2030) and design year (2052). The volumes were balanced within the study area. The existing conditions, opening year, and design year peak hour traffic volumes are shown in **Figure 40, Figure 41,** and **Figure 42.**

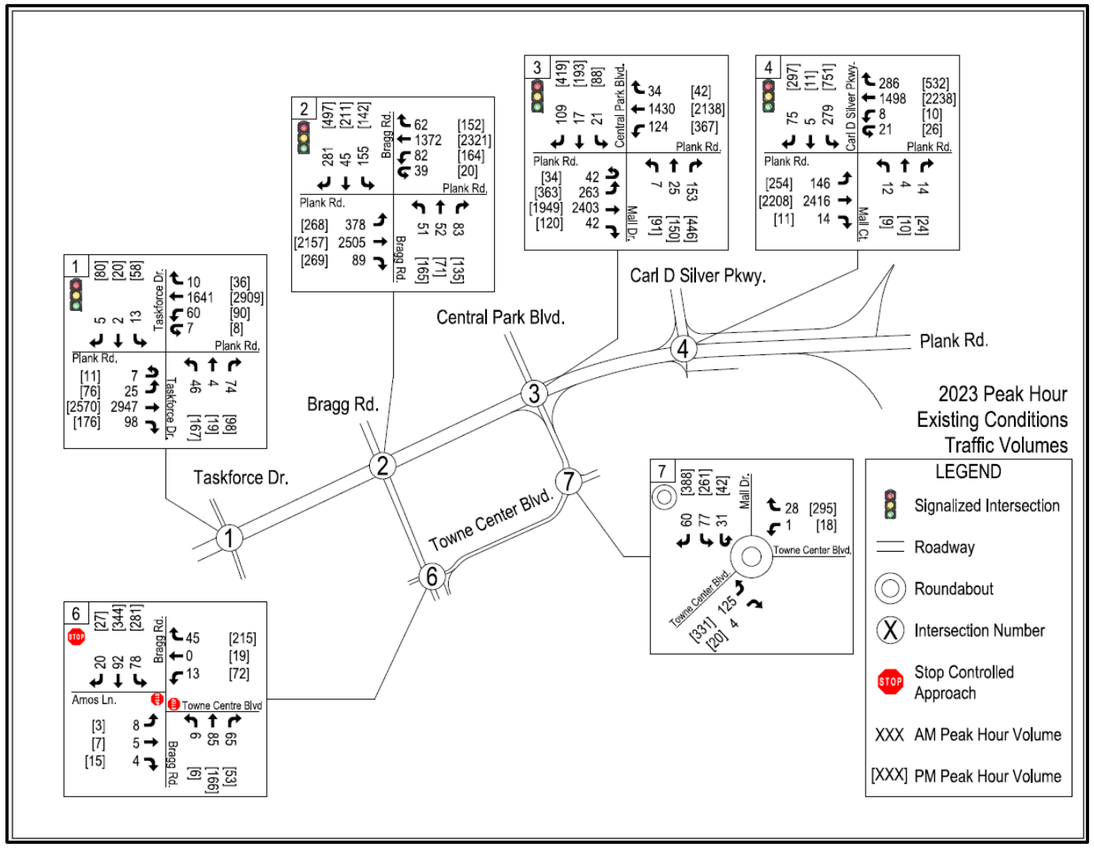


Figure 40: Existing Conditions (2023) Peak Hour Traffic Volumes

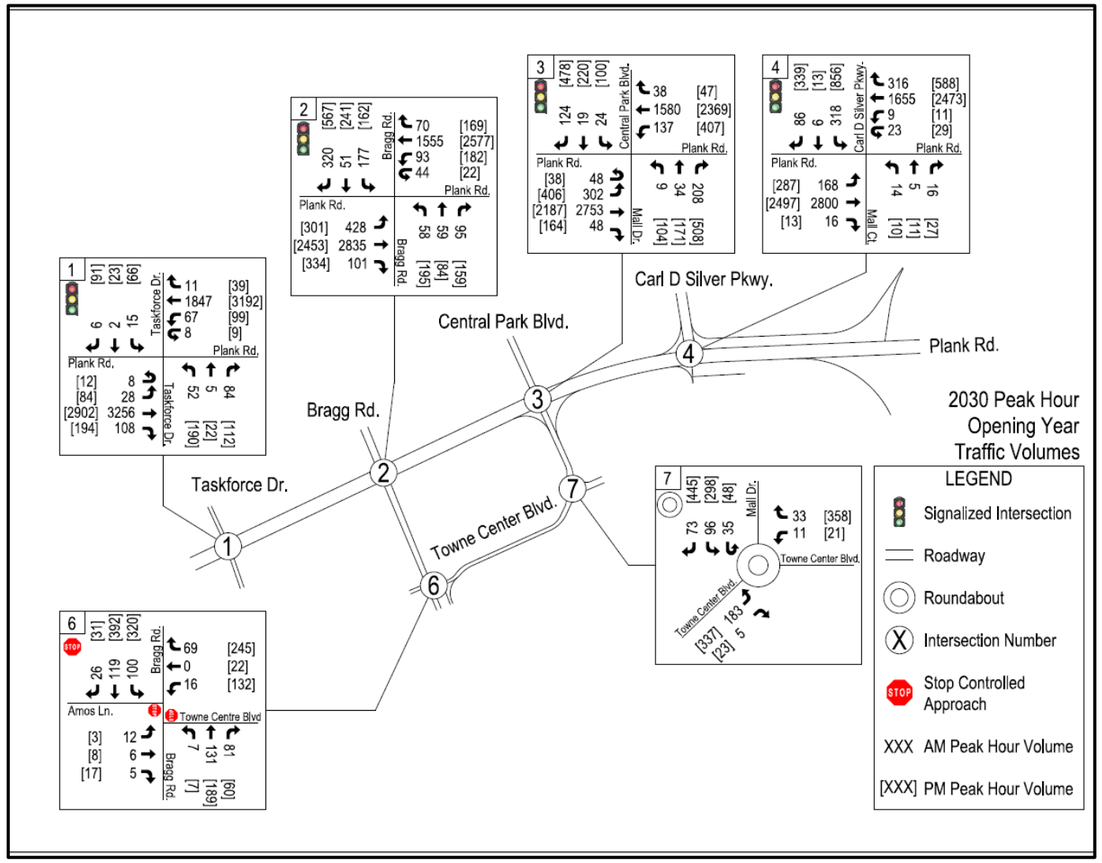


Figure 41: Opening Year (2030) Peak Hour Traffic Volumes

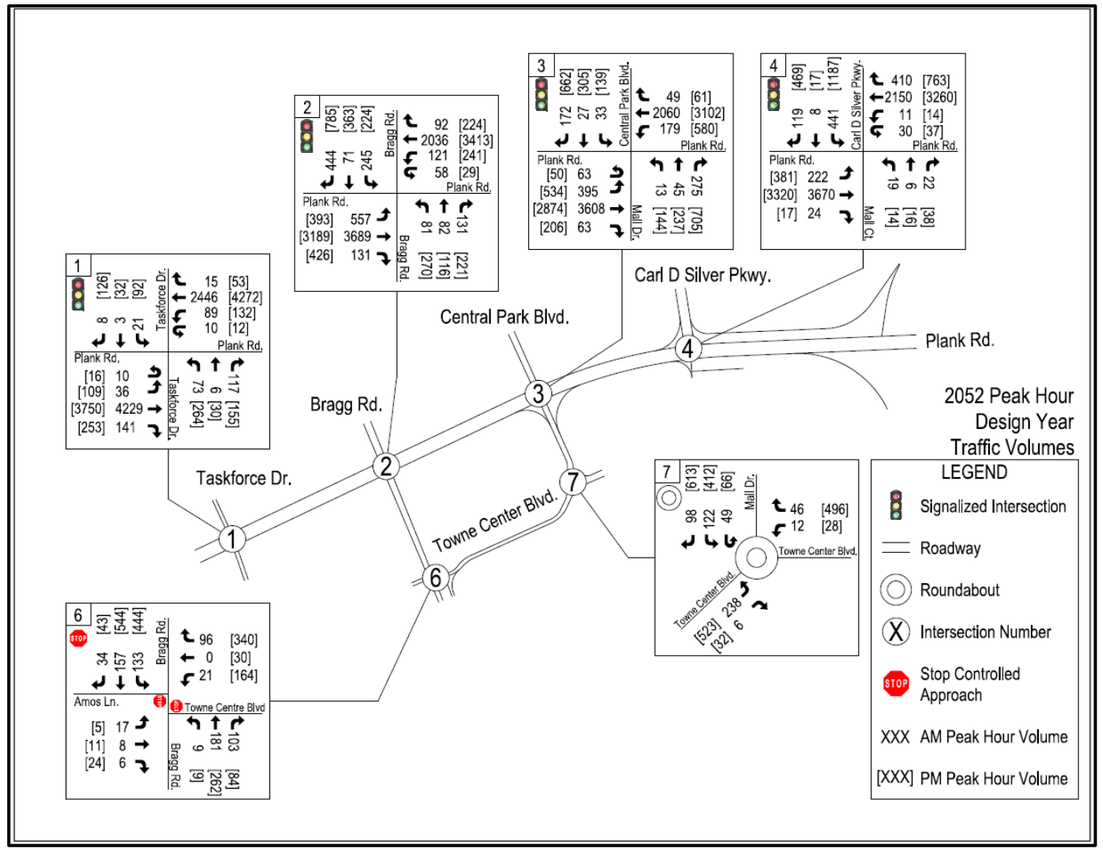


Figure 42: Design Year (2052) Peak Hour Traffic Volumes

No-Build Conditions

The existing condition (Phase 1) technical meeting, held on September 19, 2023, identified the following intersections to be further evaluated under Phase 2 of the Project Pipeline study:

- Route 3 at Taskforce Drive
- Route 3 at Bragg Road
- Route 3 at Central Park Boulevard/Mall Drive
- Route 3 at Carl D Silver Parkway/Mall Court

Traffic operational analyses were conducted to evaluate the overall performance of the intersections under No-Build AM and PM peak hour conditions with the design year volumes. The intent of the No-Build condition analysis is to provide a general understanding of the baseline future traffic conditions as a starting point for developing improvement concepts for the identified intersections. The intersection of Route 3 at Central Park Blvd./Mall Dr. No-Build condition was modelled including the planned and funded improvements under UPC 113172: the eastbound right-turn lane converted to a shared through-right lane and the existing single northbound right-turn lane converted into signalized dual right-turn lanes. A Synchro 11 model was created to simulate the No-Build condition to determine the delay and level of service at each identified intersection. The results of the No-Build condition, which are presented in **Table 7** through **Table 10**, show the identified intersections that are expected to operate at a LOS F either during the AM or PM peak hour, or both peak hours.

Table 7: Route 3 at Taskforce Drive No-Build Design Year (2052) Operational Analysis Results

ROADWAY	DIRECTION	LANE	AM Peak Hour			PM Peak Hour		
			Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)
Route 3	Eastbound	L	90.4	F	246	264.4	F	606
		T	153.8	F	1030	108.3	F	1494
		R	-	-	-	-	-	-
		Overall	**153.2**	**F**	-	**113**	**F**	-
	Westbound	L	145.7	F	435	233.2	F	580
		T	23.7	C	455	273.8	F	993
		R	6	A	14	7.9	A	829
		Overall	**28.3**	**C**	-	**269.4**	**F**	-
Task Force Drive	Northbound	L	72	E	122	195.6	F	644
		T	74.1	E	161	265.8	F	808
		R	67.4	E	134	64.5	E	484
		Overall	**69.7**	**E**	-	**175.4**	**F**	-
	Southbound	L	-		-	-	-	-
		T	70.7	E	58	262.2	F	587
		R	67.5	E	20	66.8	E	252
		Overall	**69.9**	**E**	-	**163.7**	**F**	-
OVERALL			***106.2***	***F***	-	***192.6***	***F***	-
HCM 2000 V/C Ratio (Synchro)			**1.20**			**1.57**		

Table 8: Route 3 at Bragg Road No-Build Design Year (2052) Operational Analysis Results

ROADWAY	DIRECTION	LANE	AM Peak Hour			PM Peak Hour		
			Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)
Route 3	Eastbound	L	101.4	F	590	256.3	F	914
		T	108.3	F	678	136.5	F	2099
		R	-	-	-	-	-	-
		Overall	**107.4**	F	-	**148.3**	F	-
	Westbound	L	104.9	F	192	195.5	F	796
		T	57.8	E	498	263.9	F	1663
		R	12.5	B	76	10.4	B	
		Overall	**62.4**	E	-	**244.6**	F	-
Bragg Road	Northbound	L	74.3	E	149	227.3	F	225
		T	97.6	F	250	77.9	E	311
		R	-	-	-	-	-	-
		Overall	**91.8**	F	-	**138.2**	F	-
	Southbound	L	199.5	F	360	84.5	F	343
		T	74.9	E	555	237.4	F	1712
		R	45.9	D	252	220.6	F	1550
		Overall	**80.9**	F	-	**213.5**	F	-
OVERALL			***90.8***	***F***	-	***194.8***	***F***	-
HCM 2000 V/C Ratio (Synchro)			**1.21**			**1.53**		

Table 9: Route 3 at Central Park Blvd. No-Build Design Year (2052) Operational Analysis Results

ROADWAY	DIRECTION	LANE	AM Peak Hour			PM Peak Hour		
			Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)
Route 3	Eastbound	L	72.8	E	291	210.7	F	476
		T	41.5	D	428	97.2	F	3459
		R	-	-	-	-	-	-
		Overall	**44.9**	D	-	**115.3**	F	-
	Westbound	L	263.2	F	645	363.4	F	678
		T	31.2	C	515	145.7	F	2680
		R	-	-	-	-	-	-
		Overall	**49.4**	D		**179.5**	F	-
Central Park Blvd	Northbound	L	79.8	E	21	322.2	F	337
		T	80.7	F	102	303.4	F	1173
		R	776.3	F	345	637.8	F	1154
		Overall	**655.2**	F	-	**522.6**	F	-
	Southbound	L	78.6	E	94	65.5	E	176
		T	77.4	E	151	68.8	E	1337
		R	46.5	D	258	266.4	F	350
		Overall	**54.6**	D	-	**186.8**	F	-
OVERALL			***75.8***	***E***	-	***194.6***	***F***	-
HCM 2000 V/C Ratio (Synchro)			**1.05**			**1.42**		

Table 10: Route 3 at Carl D Silver Pkwy. No-Build Design Year (2052) Operational Results

ROADWAY	DIRECTION	LANE	AM PEAK			PM Peak		
			Delay (S/Veh)	LOS	95% Queue (Ft)	Delay (S/Veh)	LOS	Delay (S/Veh)
Route 3	Eastbound	L	67.6	E	249	253.8	F	233
		T	67.1	E	693	103.7	F	1079
		R	0.1	A	85	0	A	75
		Overall	66.8	E		118.6	F	
	Westbound	L	86.1	F	34	104.2	F	187
		T	33.8	C	418	200.8	F	1651
		R	17.2	B	75	25.5	C	1597
		Overall	31.6	C		170.6	F	
Carl D Silver Parkway/ Mall Court	Northbound	L						
		T	85	F	131	96.5	F	97
		R	76.2	E	68	91.3	F	73
		Overall	81	F		93.6	F	
	Southbound	L	205.3	F	819	237.5	F	1116
		T	221.6	F	724	235.5	F	947
		R	0.1	A	527	0.7	A	558
		Overall	166.7	F		170.6	F	
OVERALL			**62.1**	E		**149.7**	F	
HCM 2000 V/C Ratio (Synchro)			**1.1**			**1.33**		

Alternative Development Screening

To develop alternative concepts to address the needs and incorporate diagnosis identified in Chapter 1, a thorough review of the existing conditions data was conducted. In July 2023, VDOT released the new Virgina Intersection and Interchange Control Assessment Program (Virginia iCAP). The tool is designed to provide a specific process for the studies in Virginia to follow. iCAP includes two stages: Stage 1: Alternatives Screening and Stage 2: Alternatives Assessment. The design year 2052 volumes were used for both the alternatives screening and assessment using iCAP. The results of this iCAP analysis are discussed in greater detail in the following report sections.

iCAP Stage 1

The first step in the iCAP process is to assess applicability, which analyzes the project location, purpose, and need to determine if intersections should continue through the full iCAP alternative screening and assessment process. Along the Route 3 corridor, the four identified intersections meet the criteria for the full Virginia iCAP process based on the iCAP applicability form. Once an intersection has met the requirements from the applicability stage, the next step is to conduct iCAP Stage 1: Alternatives Screening. In Stage 1 screening, Virginia's iCAP tool utilizes VDOT's Junction Screening Tool (VJuST) to compare key metrics for different alternatives to the base (No-Build) conditions, which aids in the selection of alternatives to move forward to Virginia iCAP Stage 2. VJuST results for each intersection are in **Appendix B**. The results of the VJuST analysis are the main iCAP Stage 1 input. Based on this input, each alternative is scored according to the impact on traffic operations, pedestrian accommodations, safety impacts, and high-level cost. Of these four categories, traffic operations and safety were chosen as the highest priority while pedestrian access and cost were weighted as moderate. Traffic operations was weighted as a high priority based on this corridor having such high volume, being on the APN network, and having VTrans needs of Capacity Preservations and Congestion Mitigation rated as high priorities. Safety is also rated as a VTrans high priority for the study corridor which is why it was also weighted as a high iCAP priority.

For the four identified intersections, the future design year No-Build (2052) traffic volumes were used for the VJuST tool to compare the potential alternatives, and the results of the VJuST analyses were entered into iCAP to develop the Stage 1 scoring. The results of the iCAP analysis for the PM peak hour at the identified intersections along Route 3 are shown in **Figure 43** through **Figure 46** (PM peak hour results are presented here since it represents the worse traffic conditions compared to AM peak hour). The iCAP Stage 1 results for both AM and PM peak hours are in **Appendix C**. The base condition in each figure shows the No-Build performance of the existing configuration. Options listed as Conventional represent lane configuration change alternatives and are described in detail in subsequent sections.

VIRGINIA iCAP ASSESSMENT OUTPUT

Stage 1: Alternatives Screening Performance Matrix

Alternative	Traffic Operations Metric		Pedestrian Metric		Safety Metric		Stage 1 Cost Metric		Total Stage 1 Score	Selected for Stage 2 Analysis?	
	VJuST Maximum V/C Ratio	Score	Accommodation	Score	Conflict Points	Score	Cost Category	Score			
Base Condition	1.24	--	0.00	--	48	--	$	--			
Conventional	1.02	0.8	0	0.5	48	0.0	$	1.0	5.4 out of 10	Yes	Simplest solution and produces significant improvement.
Conventional	1.00	0.9	0	0.5	48	0.0	$	1.0	5.7 out of 10	Yes	Simplest solution and produces significant improvement.
Thru-Cut	0.98	1.0	0	0.5	28	1.0	$$	0.5	8 out of 10	Yes	Intersection near capacity, want to model option to assess performance.

Figure 43: Route 3 at Taskforce Drive 2052 PM Peak Hour: iCAP Stage 1 Performance Matrix

VIRGINIA iCAP ASSESSMENT OUTPUT

Stage 1: Alternatives Screening Performance Matrix

Alternative	Traffic Operations Metric		Pedestrian Metric		Safety Metric		Stage 1 Cost Metric		Total Stage 1 Score	Selected for Stage 2 Analysis?	
	VJuST Maximum V/C Ratio	Score	Accommodation	Score	Conflict Points	Score	Cost Category	Score			
Base Condition	1.18	--	0.00	--	48	--	$	--			
Conventional	1.04	0.5	0	0.5	48	0.0	$	1.0	4.5 out of 10	Yes	Simplest solution and produces significant improvement.
Center Turn Overpass	0.88	1.0	+	1.0	32	0.6	$$$$	0.3	7.4 out of 10	Yes	Proposed by SWG to be considered. Performs well but high cost.
Echelon	1.03	0.5	+	1.0	28	0.7	$$$$	0.3	6.2 out of 10	No	Evaluated as similar option to center turn overpass but does not score as well.
Restricted Crossing U-Turn EB-WB	1.05	0.4	0	0.5	20	1.0	$$	0.5	6.2 out of 10	No	Not practical given high Route 3 volume and short distance to next signal.

Figure 44: Route 3 at Bragg Road 2052 PM Peak Hour iCAP Stage 1 Performance Matrix

VIRGINIA iCAP ASSESSMENT OUTPUT

Stage 1: Alternatives Screening Performance Matrix

Alternative	Traffic Operations Metric		Pedestrian Metric		Safety Metric		Stage 1 Cost Metric		Total Stage 1 Score	Selected for Stage 2 Analysis?	
	VJuST Maximum V/C Ratio	Score	Accommodation	Score	Conflict Points	Score	Cost Category	Score			
Base Condition	1.10	--	0.00	--	48	--	$	--			
Partial Median U-Turn EB-WB	1.17	0.0	+	1.0	28	1.0	$$	1.0	7 out of 10	Yes	A partial median U turn discussed by SWG - eliminating the WB LT movement
Partial Median U-Turn EB-WB	1.20	0.0	+	1.0	28	1.0	$$	1.0	7 out of 10	Yes	A partial median U turn discussed by SWG - eliminating the WB LT movement
Thru-Cut	1.20	0.0	0	0.5	28	1.0	$$	1.0	6 out of 10	No	Making U-turn on Route 3 not practical with short distances and high volumes.

Figure 45: Route 3 at Central Park Boulevard 2052 PM Peak Hour: iCAP Stage 1 Performance Matrix

VIRGINIA iCAP ASSESSMENT OUTPUT

Stage 1: Alternatives Screening Performance Matrix

Alternative	Traffic Operations Metric		Pedestrian Metric		Safety Metric		Stage 1 Cost Metric		Total Stage 1 Score	Selected for Stage 2 Analysis?	
	VJuST Maximum V/C Ratio	Score	Accommodation	Score	Conflict Points	Score	Cost Category	Score			
Base Condition	1.14	--	0.00	--	48	--	$	--			
Conventional	1.17	0.0	0	0.5	48	0.0	$	1.0	3 out of 10	Yes	This is alternative With the Flyover Ramp and With the NB connector road.
Conventional	0.93	1.0	0	0.5	48	0.0	$	1.0	6 out of 10	Yes	This is the alternative With the Flyover Ramp and Without the NB connector road.
Thru-Cut	0.99	0.7	0	0.5	28	1.0	$$	0.5	7.1 out of 10	No	NB only Thru-Cut. This option is only being pursued in conjunction with the Flyover Ramp.

Figure 46: Route 3 at Carl D Silver Parkway 2052 PM Peak Hour: iCAP Stage 1 Performance Matrix

Route 3 at Taskforce Drive

Stage 2 iCAP

Three alternatives were selected to continue to Stage 2 of the iCAP process: a lane configuration change to the westbound approach, lane configuration changes to the westbound, northbound, and southbound approaches, and a thru-cut design. During Stage 2 of the process, the selected alternatives were modeled in Synchro 11 to obtain operational results (delay and v/c ratio). Crash modification factors (CMF) were identified for the alternatives to determine the potential safety benefits of crash reduction in future years. These CMF factors were selected from VDOT's Round 5 Smart Scale CMF list and VDOT's "Virginia State Preferred CMF List" (2022). Additionally high-level planning costs were calculated utilizing VDOT'S Statewide Planning Level Cost Estimates (SPLCE) tool in conjunction with VDOT's VJuST-C tool. For each study intersection, the PM peak hour results of iCAP Stage 2 are shown. The AM peak hour results are similar to the PM peak hour result. However, traffic volumes are higher in the PM peak hour making it the more critical peak hour. **Figure 47** shows the results of Stage 2 for the PM peak hour of Route 3 at Taskforce Drive Road (results of the AM iCAP comparison are in **Appendix C**).

Stage 2: Alternatives Assessment Performance Matrix

MOE 1: *Control Delay* **MOE 2:** *V/C Ratio*

Alternative	Traffic Operations Metric			Pedestrian Metric Score	Safety Metric		Stage 2 Cost Metric		Total Stage 2 Score
	MOE 1 Score	MOE 2 Score	Total Score		Annual F+I Crash Reduction	Score	VJuST-C Cost Estimate	Score	
Conventional	0.5	0.9	0.7	0.5	0.65	1.0	$ 200,000	1.0	8.1 out of 10
Conventional	0.5	0.9	0.7	0.5	0.61	0.9	$ 500,000	0.4	6.6 out of 10
Thru-Cut	1.0	1.0	1.0	0.5	0.39	0.6	$ 500,000	0.4	6.6 out of 10
					0.00	0.0			
					0.00	0.0			
Metric Weighting	3			2	3		2		

Figure 47: Route 3 at Taskforce Drive 2052 PM Peak Hour iCAP Stage 2 Performance Matrix

Alternative 1 – Lane Configuration Change Westbound Approach

The first alternative of Route 3 at Taskforce Drive involves the restriping of the dedicated westbound right-turn lane into a shared through-right lane. No geometry changes are needed for the other three approaches. Due to the high WB through volume in both the AM and PM peak hours, the additional through lane will help improve traffic operations at a relatively low cost. **Figure 48** shows the concept sketch of Alternative 1. This alternative was modeled in Synchro 11, and the existing signal timing was optimized for both peak hours. The results for the Alternative 1 operational analysis are shown in **Table 11**. Compared to the No-Build condition for Route 3 at Taskforce Drive, Alternative 1 is expected to have an overall lower delay as well as a lower v/c ratio for both the AM and PM peak hours. However, the overall intersection is still expected to operate at LOS F in both peak hours, and the majority of movements, especially in the PM peak hour, are also expected to operate at LOS F, which is the same as the No-Build condition. The Synchro output for Alternative 1 at the Taskforce Drive intersection is in **Appendix D**.

This proposed alternative has a CMF of 0.79, which indicates crashes are expected to be reduced by 21%. The specific CMFs that were applied to calculate the overall value are as follow:

- Increase through lanes from 6 to 8+ (includes benefit of the already completed EB right-turn lane): 0.80
- Remove WB right-turn lanes (will go from four approaches with right-turn lanes to two approaches, includes the already completed removal of EB right-turn lane): 1.09
- Optimize signal timing: 0.91

Figure 48: Taskforce Drive Alternative 1 Concept Sketch

Table 11: Route 3 at Taskforce Dr. Alternative 1 Operational Analysis Results

ROADWAY	DIRECTION	LANE	AM Peak Hour						PM Peak Hour					
			No Build			Alternative 1 - Lane Configuration: WB Through/Right Lane			No Build			Alternative 1 - Lane Configuration: WB Through/Right Lane		
			Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)
Rte 3 (Plank Road)	Eastbound	L	90.4	F	246	74.3	E	192	264.4	F	606	253.8	F	620
		T	153.8	F	1030	129.5	F	702	108.3	F	1494	121.4	F	1989
		R												
		Overall	153.2	F		129	F		113	F		125.5	F	
	Westbound	L	145.7	F	435	128.4	F	472	233.2	F	580	228	F	598
		T	23.7	C	455	15.5	B	746	273.8	F	993	179.6	F	1192
		R	6	A	14				7.9	A	829			
		Overall	28.3	C		19.8	B		269.4	F		181.2	F	
Task Force Drive	Northbound	L	72	E	122	76.5	E	134	195.6	F	644	153.2	F	546
		T	74.1	E	161	82.5	F	168	265.8	F	808	205.9	F	657
		R	67.4	E	134	58.1	E	126	64.5	E	484	54.1	D	420
		Overall	69.7	E		66.8	E		175.4	F		137.8	F	
	Southbound	L												
		T	70.7	E	58	73.2	E	59	262.2	F	587	251.6	F	592
		R	67.5	E	20	60.4	E	22	66.8	E	252	58.1	E	253
		Overall	69.9	E		69.9	E		163.7	F		154.1	F	
OVERALL			**106.2**	**F**		**88.2**	**F**		**192.6**	**F**		**153.6**	**F**	
HCM 2000 V/C Ratio (Synchro)			**1.20**			**1.14**			**1.57**			**1.34**		

Alternative 2 – Lane Configuration Change Westbound, Northbound, and Southbound Approaches

Alternative 2 builds upon Alternative 1 with the conversion of the westbound dedicated right lane into a shared through-right lane. In addition, the southbound direction will be restriped from the existing dedicated shared through-left lane into just an exclusive left-turn lane. The right lane will be converted from a dedicated right-turn lane to a shared through-right lane. In the northbound direction, the shared through-left lane will be changed to a dedicated left-turn lane, giving the northbound approach dual left-turn lanes. The existing exclusive right-turn lane will be converted to a shared through-right lane. The concept sketch of this alternative is presented in **Figure 49**. Alternative 2 provides better traffic operation benefits compared to the design year No-Build condition as well as added safety benefits. This alternative was modeled in Synchro 11, and the existing signal timing was optimized for both peak hours. The results for the Alternative 2 operational analysis are shown **Table 12.** Alternative 2 is expected to have an overall lower delay as well as a lower v/c ratio for the AM and PM peak hours compared to the No-Build condition. However, like Alternative 1, the intersection is still expected to operate at LOS F and all movements in the PM peak hour are expected to operate at LOS F. Synchro output for Alternative 2 at Taskforce Drive intersection is in **Appendix D**.

This proposed alternative has a CMF of 0.83 which indicates crashes are expected to be reduced by 20%. The specific CMF's that were applied to calculate the overall value are:

- Increase through lanes from 6 to 8+ (includes benefit of the already completed EB right-turn lane): 0.80
- Remove EB, WB and NB right-turn lanes (Will go from 4 approaches with right-turn lanes to 0, includes the already completed removal of EB right-turn lane): 1.18
- Add NB left-turn lane (to existing left-turn lane): 0.97
- Optimize signal timing: 0.91

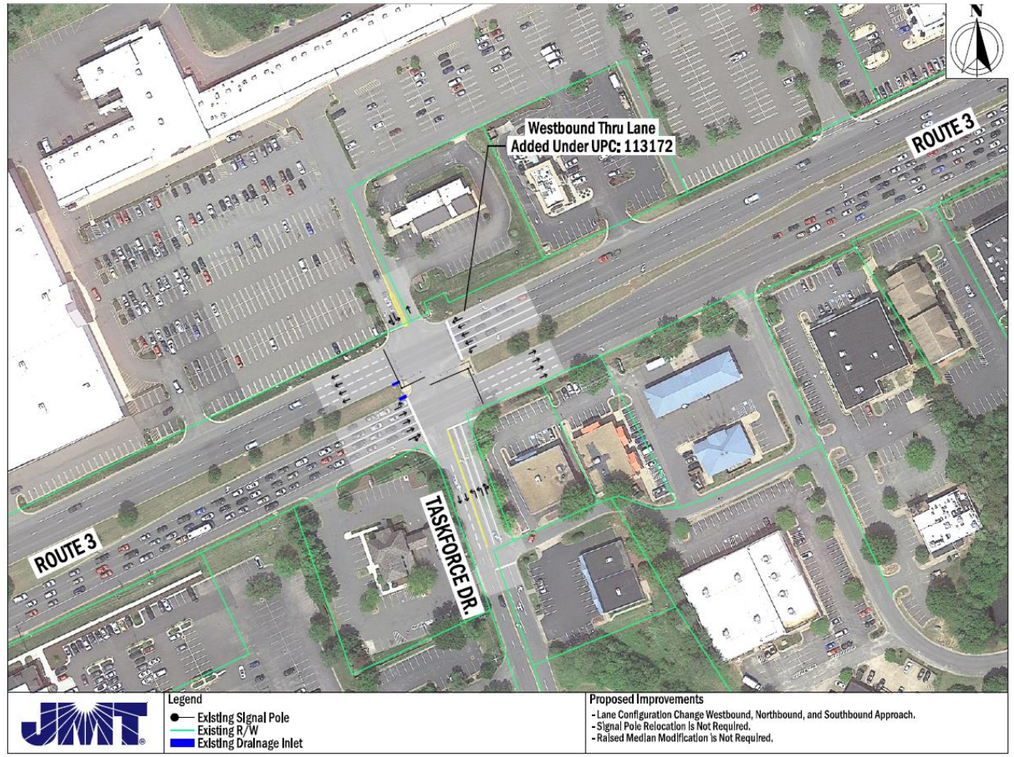


Figure 49: Route 3 at Taskforce Dr. Alternative 2 Concept Sketch

Table 12: Route 3 at Taskforce Dr. Alternative 2 Operational Analysis Results

ROADWAY	DIRECTION	LANE	AM Peak Hour						PM Peak Hour					
			No Build			Alternative 2- Lane Configuration: WB TH/RT Lane, SB LT LN NB 2nd Dedicated LT Lane			No Build			Alternative 2- Lane Configuration: WB TH/RT Lane, SB LT LN NB 2nd Dedicated LT Lane		
			Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)
Rte 3 (Plank Road)	Eastbound	L	90.4	F	246	74.3	E	198	264.4	F	606	253.8	F	612
		T	153.8	F	1030	146.5	F	775	108.3	F	1494	103.2	F	1747
		R												
		Overall	153.2	F		145.7	F		113	F		107.8	F	
	Westbound	L	145.7	F	435	128.4	F	336	233.2	F	580	228	F	585
		T	23.7	C	455	17.4	B	344	273.8	F	993	159.7	F	1132
		R	6	A	14				7.9	A	829			
		Overall	28.3	C		21.7	C		269.4	F		162	F	
Task Force Drive	Northbound	L	72	E	122	65.9	E	123	195.6	F	644	218.6	F	651
		T	74.1	E	161	69	E	236	265.8	F	808	173.9	F	835
		R	67.4	E	134				64.5	E	484			
		Overall	69.7	E		67.9	E		175.4	F		200.2	F	
	Southbound	L				72.5	E	54				146.2	F	273
		T	70.7	E	58	70.9	E	28	262.2	F	587	231.8	F	417
		R	67.5	E	20				66.8	E	252			
		Overall	69.9	E		72	E		163.7	F		200.2	F	
OVERALL			**106.2**	**F**		**99.2**	**F**		**192.6**	**F**		**140.8**	**F**	
HCM 2000 V/C Ratio (Synchro)			**1.20**			**1.14**			**1.57**			**1.33**		

Alternative 3 – Thru-Cut Design

Alternative 3 is an innovative intersection design called a Thru-Cut. This alternative would convert the existing northbound and southbound shared through-left lanes to exclusive left-turn lanes only while maintaining right-turn only lanes on both approaches. The through movement on the side street (Taskforce Drive) will be prohibited. The through movements would be required to use alternative routes. In addition, the westbound right-turn lane will be restriped into a shared through-right lane similar to Alternatives 1 and 2. Due to the low through volume during both peak hours on the side street, a thru-cut design would improve traffic operations at a relatively low cost. No additional pavement or ROW (right of way) acquisition is required. **Figure 50** shows the concept sketch of Alternative 3. Alternative 3 was modeled using Synchro 11 and includes the geometry changes listed above as well as signal optimization for the AM and PM peak hours. The results for the operational analysis of Alternative 3 are shown in **Table 13**. Alternative 3 has the greatest reduction in delay compared to the Design Year No-Build condition. The AM peak hour is expected to have an overall intersection LOS D compared to a LOS F in the No-Build condition, and LOS E in the PM peak hour. The v/c ratio is also expected to be lower during both peak hours in Alternative 3 compared to the No-Build condition. Synchro output for Alternative 3 at Taskforce Drive intersection is in **Appendix D**.

This alternative has a CMF factor of 0.91 which indicates crashes are expected to be reduced by 9%. The specific CMF's that was used was:

- Convert signal to thru cut (cannot be applied in conjunction with signal retiming/optimization): 0.91

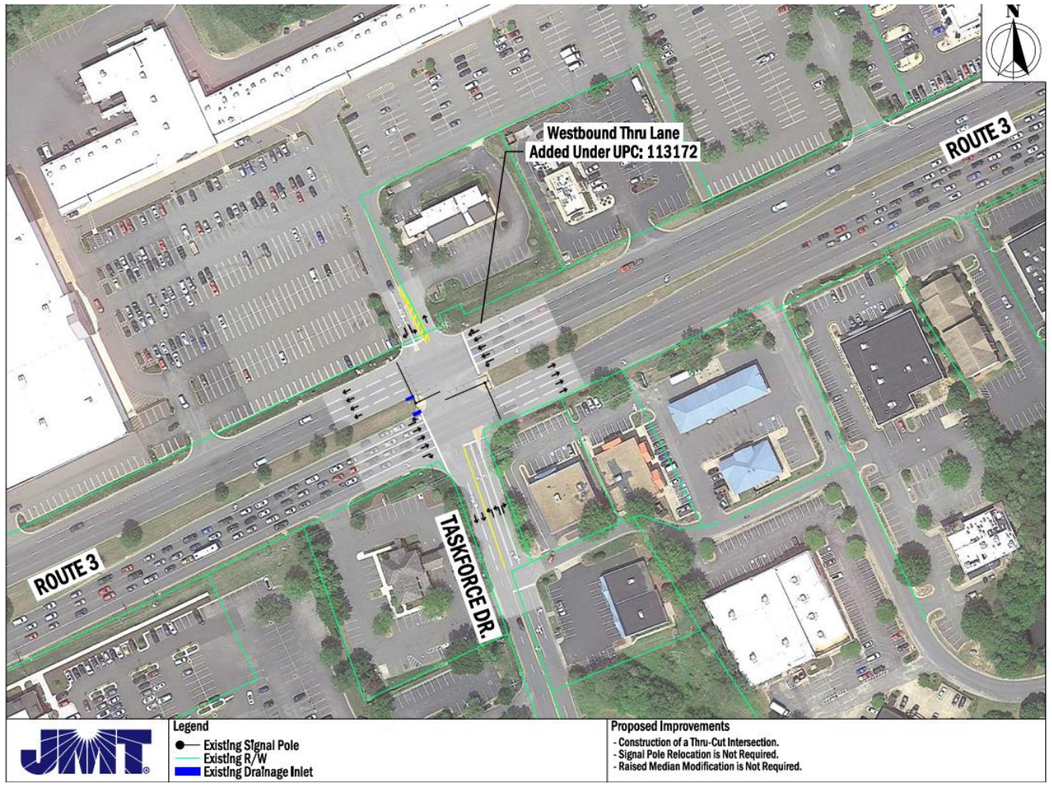


Figure 50: Route 3 at Taskforce Dr. Alternative 3 Concept Sketch

Table 13: Route 3 at Taskforce Dr. Alternative 3 Operational Analysis Results

ROADWAY	DIRECTION	LANE	AM Peak Hour						PM Peak Hour					
			No Build			Alternative 3 - Thru-Cut			No Build			Alternative 3 - Thru-Cut		
			Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)
Rte 3 (Plank Road)	Eastbound	L	90.4	F	246	74.3	E	84	264.4	F	606	253.8	F	605
		T	153.8	F	1030	72.4	E	450	108.3	F	1494	43.3	D	1329
		R												
		Overall	153.2	F		72.4	E		113	F		49.7	D	
	Westbound	L	145.7	F	435	128.4	F	491	233.2	F	580	156.8	F	575
		T	23.7	C	455	9.2	A	559	273.8	F	993	79.6	E	1454
		R	6	A	14				7.9	A	829			
		Overall	28.3	C		13.8	B		269.4	F		82	F	
Task Force Drive	Northbound	L	72	E	122	69.8	E	114	195.6	F	644	218.6	F	1364
		T	74.1	E	161				265.8	F	808			
		R	67.4	E	134	59.2	E	123	64.5	E	484	58	E	470
		Overall	69.7	E		63.2	E		175.4	F		152.4	F	
	Southbound	L				68	E	62				97.1	F	264
		T	70.7	E	58				262.2	F	587			
		R	67.5	E	20	57.9	E	26	66.8	E	252	61.3	E	195
		Overall	69.9	E		64.6	E		163.7	F		74.5	E	
OVERALL			**106.2**	F		**51.3**	D		**192.6**	F		**70.8**	E	
HCM 2000 V/C Ratio (Synchro)			**1.20**			**1.07**			**1.57**			**1.18**		

Route 3 at Taskforce Drive: Preferred Alternative

Several factors were used to create a comparison matrix that would help determine the preferred alternative for Route 3 at Taskforce Drive. These factors include safety, operations, construction costs, ROW impact, construction time, and access management. A weight was added to each of these categories based on importance. The alternatives were then ranked 1 to 3, with 1 being the least desirable alternative and 3 being the most desirable for each category and then multiplied by weight. The weighted score for each category was added for the total value for that alternative. Alternative 1 had the highest overall score of the three alternatives with 30 points followed by Alternative 3 with 28 points and lastly Alternative 2 with 27 points. However, during the SWG meeting on January 19, 2024, it was shared that VDOT has already planned and funded a project to make the improvements evaluated in Alternative 1 (under UPC 113172), and therefore, the alternative needs no further consideration**. Table 14** provides a summary of the scoring matrix. Based on the analysis and discussions in the SWG meeting, Alternative 3 – Thru Cut was determined to be the preferred alternative for the Taskforce Drive intersection.

Table 14: Route 3 at Taskforce Dr. Alternative Scoring Matrix

Ranking Factors	Weight	Weighted Score		
		Alternative 1	Alternative 2	Alternative 3
		Lane Configuration: WB TH/RT LN	Lane Configuration: WB TH/RT LN, SB LT LN, and NB 2nd LT LN	Thru Cut
Safety (CMF)	**3**	3	2	2
Operations	**3**	1	2	3
Construction Cost	**2**	3	2	2
ROW Impact	**2**	3	3	3
Construction Time	**1**	3	2	2
Access Management	**1**	3	3	1
Total		**30**	**27**	**28**
Ranking Score: From 1 (worst option) to 3 (best option)				

Route 3 at Bragg Road

Stage 2 iCAP

Two alternatives were selected to continue to Stage 2 of the iCAP process: a lane configuration change and a center-turn overpass. The lane configuration change alternative was modeled in Synchro 11, and the center-turn overpass was modeled in Vissim 2021, to obtain the MOEs. **Figure 51** shows the results of Stage 2 of iCAP for the PM peak hour of Route 3 at Bragg Road (results of the AM iCAP comparison are in **Appendix C)**.

Stage 2: Alternatives Assessment Performance Matrix

MOE 1: *Control Delay* **MOE 2:** *V/C Ratio*

Alternative	Traffic Operations Metric			Pedestrian Metric Score	Safety Metric		Stage 2 Cost Metric		Total Stage 2 Score
	MOE 1 Score	MOE 2 Score	Total Score		Annual F+I Crash Reduction	Score	VJuST-C Cost Estimate	Score	
Conventional	0.1	1.0	0.6	0.5	0.98	0.4	$ 200,000	1.0	5.9 out of 10
Center Turn Overpass	1.0	1.0	1.0	1.0	2.73	1.0	$ 26,400,000	0.0	8 out of 10
					0.00	0.0			
					0.00	0.0			
					0.00	0.0			
Metric Weighting	3			2	3		2		

Figure 51: Route 3 at Bragg Road 2052 PM Peak Hour iCAP Stage 2 Performance Matrix

Alternative 1 – Lane Configuration Change Westbound Approach

This alternative of Route 3 at Bragg Road involves the restriping of the dedicated westbound right-turn lane into a shared through-right lane. No geometry changes are needed for the other three legs. Due to the high WB through volume in both the AM and PM peak hour, the additional through lane will help improve traffic operations at a relatively low cost. No additional pavement or ROW acquisition is required. **Figure 52** shows the concept sketch of Alternative 1. This alternative lane configuration was modeled using Synchro 11, with signal optimization for the AM and PM peak hours. The results for Alternative 1 design year operational analysis are shown in **Table 15**. Compared to the design year No-Build condition for Route 3 at Bragg Road, Alternative 1 has an overall lower delay as well as a lower v/c ratio for both the AM and PM peak hours. However, overall delays during both peaks are still LOS F and the majority of movements, especially in the PM peak hour, are still operating at LOS F. Synchro output for Alternative 1 at Bragg Road intersection is in **Appendix E**.

The proposed alternative has a CMF factor of 0.79 which indicates crashes are expected to be reduced by 21%. The specific CMF's that were applied to calculate the overall value are:

- Increase through lanes from 6 to 8+ (includes benefit of the already completed EB right-turn lane): 0.80
- Remove EB and WB right-turn lanes (Will go from four approaches with right-turn lanes to two, includes the already completed removal of EB right-turn lane in the calculation): 1.09
- Optimize signal timing: 0.91

Figure 52: Route 3 at Bragg Rd. Alternative 1 Concept Sketch

Table 15: Route 3 at Bragg Rd. Alternative 1 Operational Analysis Results

ROADWAY	DIRECTION	LANE	AM Peak Hour						PM Peak Hour					
			No Build			Alternative 1 - WB Through/Right Lane			No Build			Alternative 1 - WB Through/Right Lane		
			Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)
Rte 3 (Plank Road)	Eastbound	L	101.4	F	590	68.3	E	485	256.3	F	914	185.6	F	938
		T	108.3	F	678	108.3	F	769	136.5	F	2099	143.6	F	1956
		R												
		Overall	107.4	F		103.2	F		148.3	F		147.8	F	
	Westbound	L	104.9	F	192	144.3	F	358	195.5	F	796	242.2	F	760
		T	57.8	E	498	41.7	D	417	263.9	F	1663	197.1	F	1757
		R	12.5	B	76				10.4	B				
		Overall	62.4	E		49.7	D		244.6	F		200.2	F	
Bragg Road	Northbound	L	74.3	E	149	74.3	E	141	227.3	F	225	227.3	F	236
		T	97.6	F	250	97.6	F	249	77.9	E	311	78.8	E	337
		R												
		Overall	91.8	F		91.8	F		138.2	F		138.7	F	
	Southbound	L	199.5	F	360	199.5	F	330	84.5	F	343	73.1	E	364
		T	74.9	E	555	74.9	E	401	237.4	F	1712	179.7	F	1712
		R	45.9	D	252	41.8	D	253	220.6	F	1550	159.3	F	1545
		Overall	80.9	F		78.5	E		213.5	F		158.0	F	
OVERALL			**90.8**	**F**		**84.4**	**F**		**194.8**	**F**		**169.4**	**F**	
HCM 2000 V/C Ratio (Synchro)			**1.21**			**1.16**			**1.53**			**1.36**		

Alternative 2 – Center Turn Overpass

Alternative 2 of Route 3 at Bragg Road is a center turn overpass. This innovative intersection provides a grade separated roadway for the left turning vehicles for all approaches, thus creating two separate intersections: the at-grade intersection is for the through and right-turn movements and the grade separated intersection is for the left-turn movements for all the approaches. While costly, this alternative provides significant benefits to traffic operations for both peak hours. **Figure 53** shows the concept sketch of Alternative 2. Additional ROW and pavement is required for this alternative. A full take of the existing Starbucks property located on the southeast quadrant of the intersection is required. Partial ROW acquisition will also be required at the car wash located on the east side of Bragg Road. The results for Alternative 2 operational analysis are shown in **Table 16**. Due to the complexity, Alternative 2 was modeled using Vissim. The model includes the grade separated intersection for left turning vehicles as well as signal optimization for both the AM and PM peak hours. Compared to the Design Year No-Build condition for Route 3 at Bragg Road, Alternative 2 performs significantly better in the AM and PM peak hours. With Alternative 2, the intersection is expected to operate at an overall LOS B and LOS C during the AM and PM peak hours, respectively. Queue lengths, however, are very high during both peak hours in Alternative 2 at over 750 and 600 feet on Route 3 in the EB and WB directions, respectively.

The proposed alternative has a CMF of 0.58 which indicates crashes are expected to be reduced by 42%. The specific CMF's that were applied to calculate the overall value are:

- Replace arterial turns with loops or directional ramps (Round 5 CMF list)/Convert signal to median U-Turn intersection (Round 5 CMF list)/Prohibit left turns: 0.63
- Retime or optimize signals: 0.91

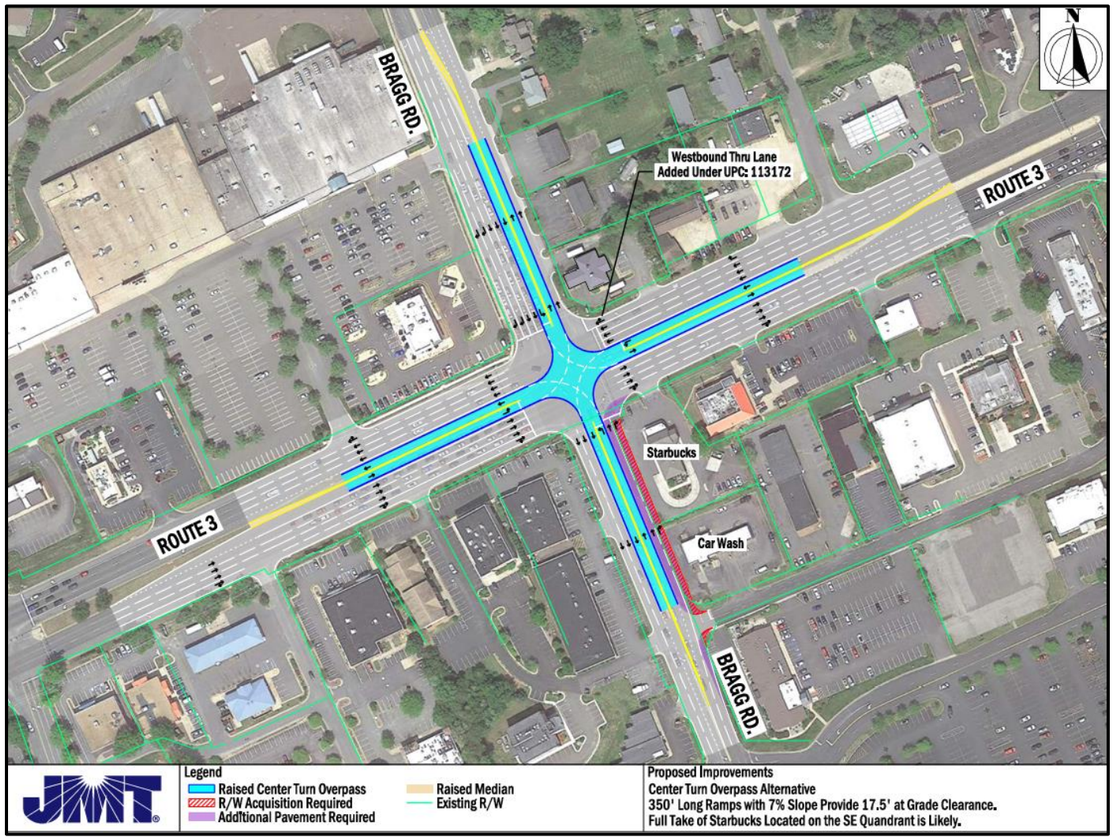


Figure 53: Route 3 at Bragg Rd. Alternative 2 Concept Sketch

Table 16: Route 3 at Bragg Rd. Alternative 2 Operational Analysis Results

ROADWAY	DIRECTION	LANE	AM Peak Hour						PM Peak Hour					
			No Build			Alternative 2- Center Turn Overpass (Vissim)			No Build			Alternative 2- Center Turn Overpass (Vissim)		
			Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)
Rte 3 (Plank Road)	Eastbound	L	101.4	F	590	17.1	B	306	256.3	F	914	16.3	B	234
		T	108.3	F	678	9.0	A	436	136.5	F	2099	20.3	C	755
		R				9.8	A	436				25.8	C	755
		Overall	107.4	F					148.3	F				
	Westbound	L	104.9	F	192	9.4	A	107	195.5	F	796	13.7	B	142
		T	57.8	E	498	2.7	A	139	263.9	F	1663	15.6	B	612
		R	12.5	B	76	4.6	A	139	10.4	B		17.6	B	612
		Overall	62.4	E					244.6	F				
Bragg Road	Northbound	L	74.3	E	149	24.4	C	81	227.3	F	225	19.7	B	172
		T	97.6	F	250	162.4	F	531	77.9	E	311	70.3	E	606
		R				301.9	F	531				129.9	F	606
		Overall	91.8	F					138.2	F				
	Southbound	L	199.5	F	360	20.7	C	173	84.5	F	343	17.0	B	131
		T	74.9	E	555	48.7	D	303	237.4	F	1712	43.7	D	480
		R	45.9	D	252	71.5	E	303	220.6	F	1550	64.2	E	480
		Overall	80.9	F					213.5	F				
OVERALL			**90.8**	F		**18.2**	B		**194.8**	F		**25.4**	C	
HCM 2000 V/C Ratio (Synchro)			**1.21**						**1.53**					

Route 3 at Bragg Road: Preferred Alternative

Several factors were used to create a comparison matrix that would help determine the preferred alternative for Route 3 at Bragg Road. These factors include safety, operations, construction costs, ROW impact, construction time, and access management. A weight was added to each of these categories based on importance. The alternatives were then ranked either 1 or 2 with 1 being the least desirable alternative and 2 being the most desirable for each category and then multiplied by weight. The weighted score for each category was added for the total value for that alternative. Alternative 1 and Alternative 2 tied in score with both having a value of 18. Alternative 1 performed better in 4 of the 6 categories while Alternative 2 scored higher in safety and traffic operations. **Table 17** provides a summary of the scoring matrix. During the Phase 2 SWG meeting, it was shared that, like at Taskforce Drive, Alternative 1 is already planned and funded under the UPC 113172 project. Therefore, the center turn overpass alternative was the only alternative to consider. Several constructability items were discussed – including how to maintain flow of traffic along Route 3 during such a complex and substantial construction, positioning of construction equipment, the need to bring Bragg up to VDOT standards, and the overall cost. No preferred alternative was agreed to, and further exploration and discussion was planned.

Table 17: Route 3 at Bragg Rd. Alternative Scoring Matrix

Ranking Factors	Weight	Weighted Score	
		Alternative 1	Alternative 2
		Lane Configuration: WB TH/RT LN	Center Turn Overpass
Safety (CMF)	3	1	2
Operations	3	1	2
Construction Cost	2	2	1
ROW Impact	2	2	1
Construction Time	1	2	1
Access Management	1	2	1
Total		18	18
Ranking Score: From 1 (worst option) to 2 (best option)			

Route 3 at Central Park Boulevard/Mall Drive

Stage 2 iCAP

Two alternatives were selected to continue to Stage 2 of the iCAP process for the intersection of Route 3 at Central Park Boulevard. The selected alternatives were modeled in Synchro 11 to obtain MOEs. **Figure 54** shows the results of Stage 2 of iCAP for the PM peak hour of Route 3 at Central Park Boulevard/Mall Drive (results of the AM iCAP comparison are in **Appendix C**).

Stage 2: Alternatives Assessment Performance Matrix

MOE 1: *Control Delay* **MOE 2:** *V/C Ratio*

Alternative	Traffic Operations Metric			Pedestrian Metric Score	Safety Metric		Stage 2 Cost Metric		Total Stage 2 Score
	MOE 1 Score	MOE 2 Score	Total Score		Annual F+I Crash Reduction	Score	VJuST-C Cost Estimate	Score	
Partial Median U-Turn EB-WB	0.9	0.9	0.9	1.0	1.44	0.7	$1,500,000	1.0	8.8 out of 10
Partial Median U-Turn EB-WB	1.0	1.0	1.0	1.0	1.98	1.0	$ 1,700,000	0.9	9.8 out of 10
					0.00	0.0			
					0.00	0.0			
					0.00	0.0			
Metric Weighting	3			2	3		2		

Figure 54: Route 3 at Central Park Blvd./Mall Dr. 2052 PM Peak Hour iCAP Stage 2 Performance Matrix

Alternative 1 – Modified Partial Median U-Turn – No Westbound Left-Turn Movement

Alternative 1 of Route 3 at Central Park Boulevard is a modified partial median U-turn (Partial MUT) in the westbound direction of Route 3. The left-turn movement into Mall Drive would be eliminated and replaced with either a raised median, gore markings, or additional storage for the eastbound left turns at Route 3 at Carl D Silver Parkway. The westbound lefts would be rerouted to the intersection of Route 3 at Bragg Road to perform their left turn. **Figure 55** shows the concept sketch of Alternative 1. This alternative also includes the planned UPC 113172 changes described in the **No-Build Conditions** section. No additional pavement or ROW acquisition is required. This alternative is expected to provide safety benefits as well as operational benefits. This alternative was modeled using Synchro 11. The results of the operational analysis are shown in **Table 18**. Compared to the Design Year No-Build condition for Route 3 at Central Park Boulevard, Alternative 1 performs slightly better in the AM peak hour but worse in the PM peak hour. With Alternative 1, the intersection is expected to operate at an overall LOS E and LOS F during the AM and PM peak hours, respectively. Likewise, the AM peak hour has a better v/c ratio compared to the No-Build condition (0.97 vs 1.05) while the PM peak hour has a worse v/c ratio (1.68 vs 1.42). Synchro output for Alternative 1 at Central Park Boulevard intersection is in **Appendix F**.

The proposed alternative has a CMF of 0.79 which indicates crashes are expected to be reduced by 21%. The specific CMF's that were applied to calculate the overall value are:

- Applying average of left-turn related CMF's to only WB left turns: 0.87
- Optimize signal timing: 0.91

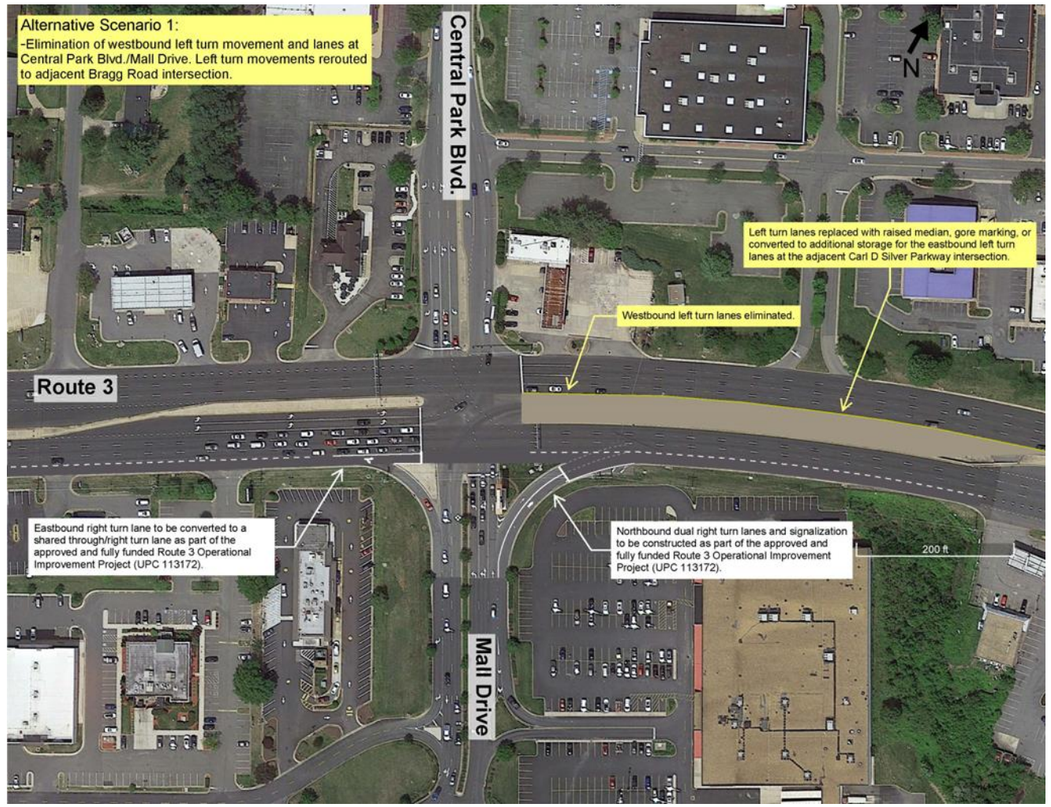


Figure 55: Route 3 at Central Park Blvd./Mall Dr. Alternative 1 Concept Sketch

Table 18: Route 3 at Central Park Blvd./Mall Dr. Alternative 1 Operational Analysis Results

ROADWAY	DIRECTION	LANE	AM Peak Hour						PM Peak Hour					
			No Build			Alternative 1 - WB Lefts Rerouted			No Build			Alternative 1 - WB Lefts Rerouted		
			Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)
Rte 3 (Plank Road)	Eastbound	L	72.8	E	291	81.7	F	316	210.7	F	476	234.1	F	481
		T	41.5	D	428	17	B	629	97.2	F	3459	19.8	B	3367
		R												
		Overall	44.9	D		24.2	C		115.3	F		54	D	
	Westbound	L	263.2	F	645				363.4	F	678			
		T	31.2	C	515	31.8	C	405	145.7	F	2680	202.9	F	2576
		R												
		Overall	49.4	D		31.8	C		179.5	F		202.9	F	
Central Park Blvd.	Northbound	L	79.8	E	21	79.8	E	29	322.2	F	337	92.8	F	223
		T	80.7	F	102	80.7	F	121	303.4	F	1173	82.7	F	248
		R	776.3	F	345	1027.5	F	225	637.8	F	1154	911	F	395
		Overall	655.2	F		862.7	F		522.6	F		621.6	F	
	Southbound	L	78.6	E	94	78.3	E	88	65.5	E	176	185.6	F	179
		T	77.4	E	151	77.2	E	150	68.8	E	1337	261.9	F	1343
		R	46.5	D	258	49.8	D	260	266.4	F	350	493.3	F	351
		Overall	54.6	D		57	E		186.8	F		391.9	F	
OVERALL			**75.8**	E		**67.8**	E		**194.6**	F		**215.2**	F	
HCM 2000 V/C Ratio (Synchro)			**1.05**			**0.97**			**1.42**			**1.68**		

Alternative 2 – Modified Partial Median U-Turn – No Westbound Left-Turn Movement, Additional Westbound Through Lane

Alternative 2 of Route 3 at Central Park Boulevard is similar to Alternative 1 in that it is a modified partial median U-turn (Partial MUT) in the westbound direction of Route 3. However, the left-turn movement into Mall Drive would be eliminated and converted into an additional through lane that becomes a left-turn lane at the intersection of Route 3 at Bragg Road. As with other Design Year models for this intersection, the UPC 113172 improvements are also included in Alternative 2. This alternative is expected to provide greater safety benefits as well as minor operational benefits. **Figure 56** shows the concept sketch of Alternative 2. No ROW acquisition is required; however, additional pavement would be needed where the current concreate median is to be removed. This alternative was modeled using Synchro 11. The results of the operational analysis are shown in **Table 19.** Compared to the Design Year No-Build condition for Route 3 at Central Park Boulevard, Alternative 2 performs better in terms of overall delay in both peak hours. The AM peak hour is expected to have a slightly better v/c ratio (1.00 vs 1.05), and worse v/c ratio (1.56 vs 1.42) during the PM peak hour. This indicates that the intersection is expected to operate at or over capacity with Alternative 2. Synchro output for Alternative 2 at Central Park Boulevard intersection is in **Appendix F**.

The proposed alternative has a CMF of 0.71 which indicates crashes are expected to be reduced by 29%. The specific CMF's that were applied to calculate the overall value are:

- Applying average of left-turn related CMF's to only WB left turns: 0.87
- Increase number of through lanes from 7 to 8+: 0.90
- Optimize signal timing: 0.91

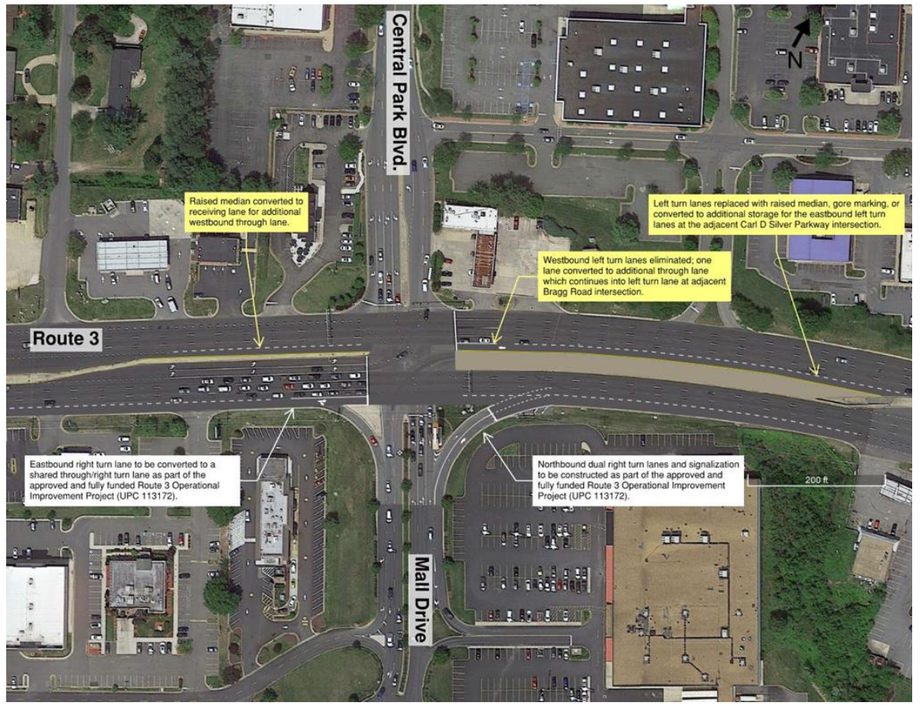


Figure 56: Route 3 at Central Park Blvd./Mall Dr. Alternative 2 Concept Sketch

Table 19: Route 3 at Central Park Blvd./Mall Dr. Alternative 2 Operational Analysis Results

ROADWAY	DIRECTION	LANE	AM Peak Hour						PM Peak Hour					
			No Build			Alternative 2- WB Lefts Rerouted with Through Lane Added			No Build			Alternative 2- WB Lefts Rerouted with Through Lane Added		
			Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)
Rte 3 (Plank Road)	Eastbound	L	72.8	E	291	78.8	E	302	210.7	F	476	210.7	F	477
		T	41.5	D	428	27	C	339	97.2	F	3459	19.4	B	3498
		R				0.1	A					0.3	A	
		Overall	44.9	D		32.3	C		115.3	F		84.9	F	
	Westbound	L	263.2	F	645				363.4	F	678			
		T	31.2	C	515	30.5	C	429	145.7	F	2680	119	F	654
		R												
		Overall	49.4	D		30.5	C		179.5	F		119	F	
Central Park Blvd.	Northbound	L	79.8	E	21	74.9	E	24	322.2	F	337	85.8	F	223
		T	80.7	F	102	75.5	E	95	303.4	F	1173	77.8	E	247
		R	776.3	F	345	356.4	F	188	637.8	F	1154	829.7	F	374
		Overall	655.2	F		307.5	F		522.6	F		566.8	F	
	Southbound	L	78.6	E	94	78.6	E	82	65.5	E	176	219.9	F	188
		T	77.4	E	151	77.4	E	149	68.8	E	1337	312.2	F	1333
		R	46.5	D	258	49	D	255	266.4	F	350	501.2	F	352
		Overall	54.6	D		56.4	E		186.8	F		415	F	
OVERALL			**75.8**	E		**45.7**	D		**194.6**	F		**177**	F	
HCM 2000 V/C Ratio (Synchro)			**1.05**			**1**			**1.42**			**1.56**		

Route 3 at Central Park Boulevard/Mall Drive: Preferred Alternative

Several factors were used to create a comparison matrix that would help determine the preferred alternative for Route 3 at Central Park Boulevard. These factors include safety, operations, construction costs, ROW impact, construction time, and access management. A weight was added to each of these categories based on importance. The alternatives were then ranked either 1 or 2 with 1 being the least desirable alternative and 2 being the most desirable for each category and then multiplied by weight. The weighted score for each category was added for the total value for that alternative. **Table 20** provides a summary of the scoring matrix. Alternative 2 performed better than Alternative 1 with a score of 21 vs 18. Alternative 2 outperformed Alternative 1 in safety and traffic operations while Alternative 1 was better in construction cost and construction time. Both categories had the same score in ROW impact because no ROW impact is expected, and access management. Based on the scoring matrix and discussion with the SWG, Alternative 2 is the preferred alternative, with the implementation of improvements at either the upstream or downstream intersections.

Table 20: Route 3 at Central Park Blvd./Mall Dr. Alternative Scoring Matrix

Ranking Factors	Weight	Weighted Score	
		Alternative 1	Alternative 2
		WB Lefts Rerouted	WB Lefts Rerouted with Through Lane
Safety (CMF)	3	1	2
Operations	3	1	2
Construction Cost	2	2	1
ROW Impact	2	2	2
Construction Time	1	2	1
Access Management	1	2	2
Total		**18**	**21**
Ranking Score: From 1 (worst option) to 2 (best option)			

Route 3 at Carl D Silver Parkway/Mall Court

Stage 2 iCAP

Two alternatives were selected to continue to Phase 2 for the intersection of Route 3 at Carl D Silver Parkway/Mall Court. The alternatives were modeled in Vissim 21 to obtain the MOEs. **Figure 57** shows the results of Stage 2 for iCAP for the PM peak hour of Route 3 at Carl D Silver Parkway.

Stage 2: Alternatives Assessment Performance Matrix

MOE 1: *Control Delay* MOE 2: *V/C Ratio*

Alternative	Traffic Operations Metric			Pedestrian Metric Score	Safety Metric		Stage 2 Cost Metric		Total Stage 2 Score
	MOE 1 Score	MOE 2 Score	Total Score		Annual F+I Crash Reduction	Score	VJuST-C Cost Estimate	Score	
Conventional	0.7	1.0	0.9	0.5	5.88	1.0	$26,600,000	1.0	8.6 out of 10
Conventional	1.0	1.0	1.0	0.5	5.88	1.0	$ 26,000,000	1.0	9 out of 10
					0.00	0.0			
					0.00	0.0			
					0.00	0.0			
Metric Weighting	3			2	3		2		

Figure 57: Route 3 at Carl D Silver Pkwy. /Mall Ct. 2052 PM Peak Hour iCAP Stage 2 Performance Matrix

Alternative 1 – Flyover Ramp from Route 3 Westbound onto Mall Court Eastbound

Alternative 1 of Route 3 at Carl D Silver Parkway is a flyover ramp with a grade separated connection from the westbound direction of Route 3 to Towne Centre Boulevard. For the alternative, the westbound left lane will be grade separated from the intersection and connect to the Towne Centre Boulevard eastbound direction. The northbound direction (Mall Court) will be converted to two right-turn lanes, and the southbound direction will be converted to three left-turn lanes and a right-turn lane. Additionally, Towne Centre Boulevard will be connected to Mall Court northbound as shown in **Figure 58**. ROW acquisition and additional pavement are needed. A full take of the existing Burger King property located on the southwest quadrant of the intersection is required. Partial acquisition of the Towne Centre development is required. While costly, this alternative is expected to provide safety benefits as well as significant operational benefits – overall intersection delay is reduced to approximately half that of the No-Build scenario. Due to the complexity of this alternative, Vissim was used to analyze this alternative. The results for Alternative 1 operational analysis are shown in **Table 21**. Compared to the Design Year No-Build condition for Route 3 at Carl D Silver Parkway, Alternative 1 performs better in terms of overall delay and LOS in both peak hours. In the AM peak hour, the intersection is expected to improve from a delay of 62.1 s/veh (LOS E) to 28.0 s/veh (LOS C). In the PM peak hour, the intersection is expected to improve from a delay of 149.7 s/veh (LOS F) to 76.2 s/veh (LOS E).

The proposed alternative has a CMF factor of 0.79 which indicates crashes are expected to be reduced by 21%. The specific CMF's that were applied to calculate the overall value are:

- Removing WB left turn: 0.87
- Optimize signal timing: 0.91

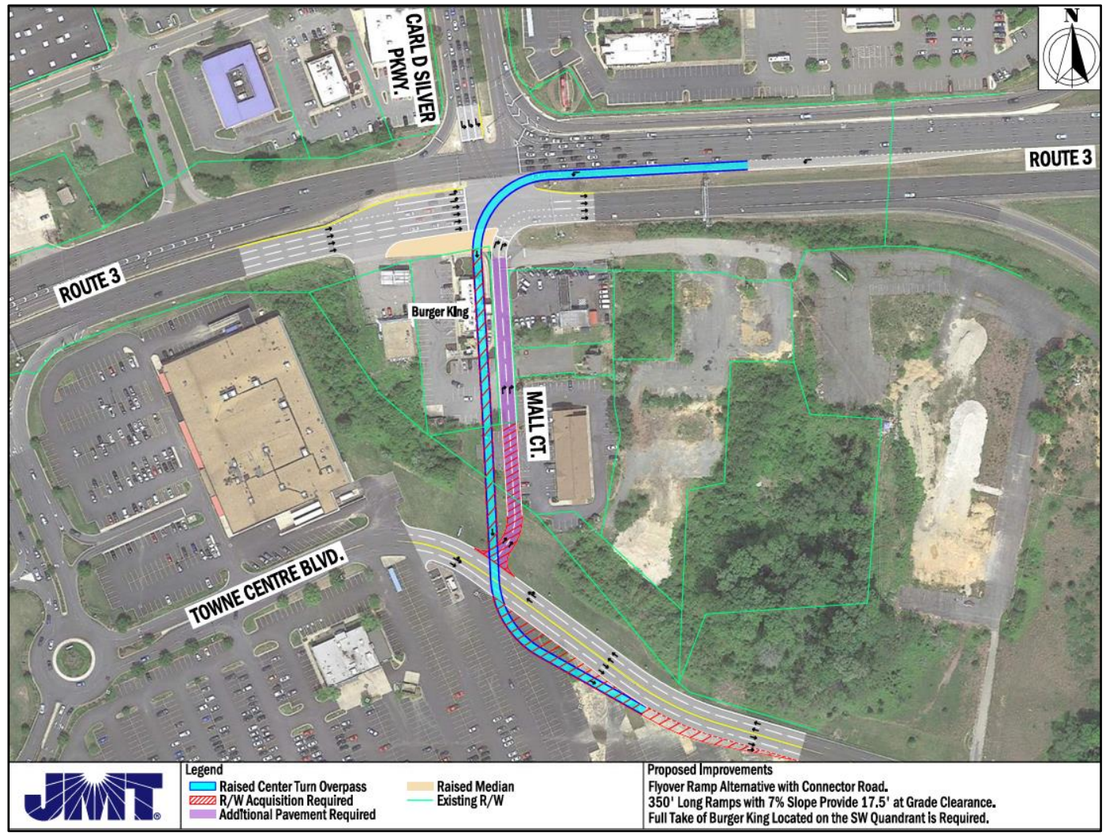


Figure 58: Route 3 at Carl D Silver Pkwy./Mall Ct. Alternative 1 Concept Sketch

Table 21: Route 3 at Carl D Silver Pkwy./Mall Ct. Alternative 1 Operational Analysis

ROADWAY	DIRECTION	LANE	AM Peak Hour						PM Peak Hour					
			No Build			Alternative 1 - Ramp Flyover (with new connector)			No Build			Alternative 1 - Ramp Flyover (with new connector)		
			Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)
Rte 3 (Plank Road)	Eastbound	L	67.6	E	249	64.38	E	603.19	253.8	F	233	241.74	F	846.64
		T	67.1	E	693	17.47	B	603.19	103.7	F	1079	33.06	C	846.64
		R	0.1	A	85				0	A	75			
		Overall	66.8	E					118.6	F				
	Westbound	L	86.1	F	34	0.55	A	0	104.2	F	187	1.22	A	0
		T	33.8	C	418	25.45	C	331.94	200.8	F	1651	48	D	710.56
		R	17.2	B	75	11.61	B	331.94	25.5	C	1597	20.52	C	710.56
		Overall	31.6	C					170.6	F				
Carl D Silver Pkwy./ Mall Ct	Northbound	L												
		T	85	F	131				96.5	F	97			
		R	76.2	E	68	197.47	F	323.17	91.3	F	73	510.94	F	1653.27
		Overall	81	F					93.6	F				
	Southbound	L	205.3	F	819	68.52	E	207.5	237.5	F	1116	214.45	F	1298.06
		T	221.6	F	724				235.5	F	947			
		R	0.1	A	527	0.96	A	207.5	0.7	A	558	37.65	D	1298.06
		Overall	166.7	F					170.6	F				
OVERALL			**62.1**	E		**28.0**	C		**149.7**	F		**76.2**	E	
HCM 2000 V/C Ratio (Synchro)			**1.1**						**1.33**					

Alternative 2 – Flyover ramp from Route 3 Westbound onto Mall Court Eastbound and Thru-Cut Design at Intersection

Alternative 2 of Route 3 at Carl D Silver Parkway is similar to Alternative 1 in that it is a flyover ramp with a grade separated connection from the westbound direction of Route 3 to Town Center Boulevard, however, for this alternative, there is no northbound connection between Town Centre Boulevard and Mall Court. In addition, a thru-cut will be implemented for the northbound and southbound directions, thus restricting the through movements. Alternative 2 is expected to provide safety benefits as well as significant operational benefits. **Figure 59** shows the concept sketch of Alternative 2. Both ROW acquisition and additional pavement is needed. A full take of the existing Burger King property located on the southwest quadrant of the intersection is required. Partial acquisition of the Towne Centre development is required.

Vissim was used to analyze this alternative. The results for Alternative 2 operational analysis are shown in **Table 22**. Compared to the Design Year No-Build condition for Route 3 at Carl D Silver Parkway, Alternative 2 performs significantly better in terms of overall delay and LOS in both the AM and PM peak hours. In the AM peak hour, the intersection is expected to improve from a delay of 62.1 s/veh (LOS E) to 18.75 s/veh (LOS B). In the PM peak hour, the intersection is expected to improve from a delay of 149.7 s/veh (LOS F) to 43.7 s/veh (LOS D).

The proposed alternative has a CMF of 0.79 which indicates crashes are expected to be reduced by 21%. The specific CMF's that were applied to calculate the overall value are:

- Removing WB left turns: 0.87
- Optimize signal timing: 0.91

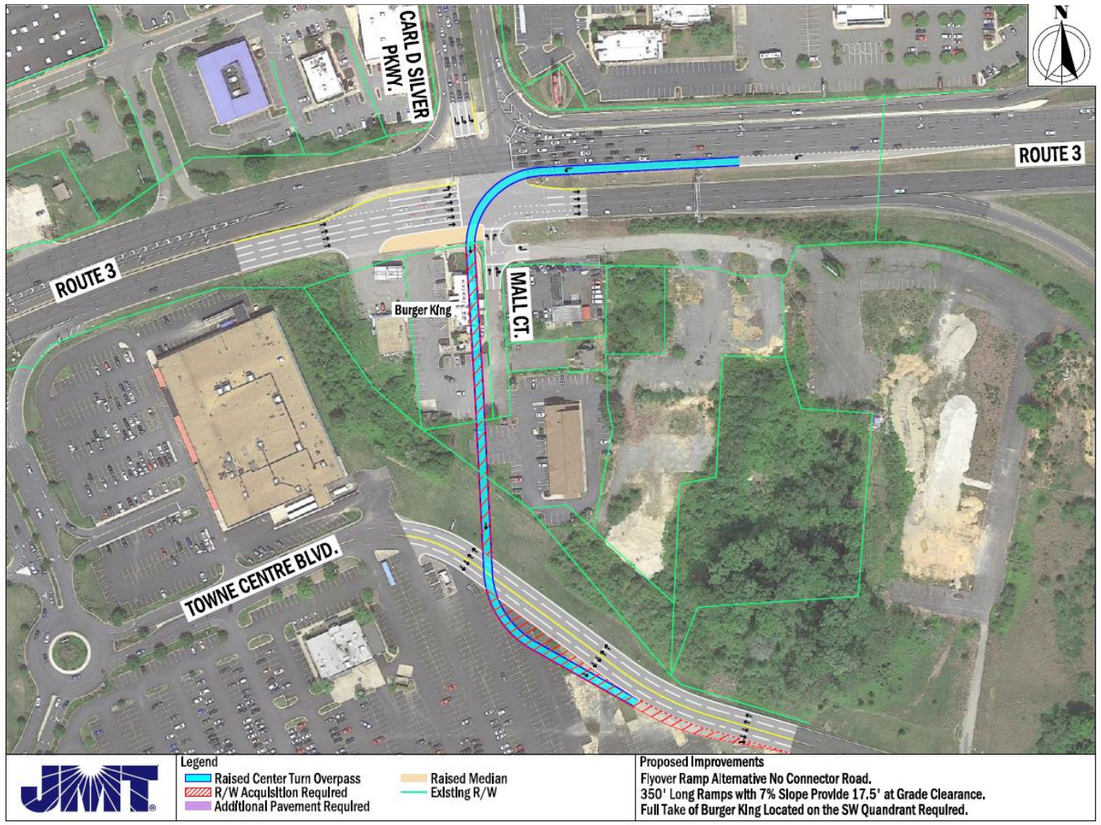


Figure 59: Route 3 at Carl D Silver Pkwy./Mall Ct. Alternative 2 Concept Sketch

Table 22: Route 3 at Carl D Silver Pkwy./Mall Ct. Alternative 2 Operational Analysis Results

ROADWAY	DIRECTION	LANE	AM Peak Hour						PM Peak Hour					
			No Build			Alternative 2 - Flyover without connector, and thru cut design			No Build			Alternative 2 - Flyover without connector, and thru cut design		
			Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)	Delay (S/Veh)	LOS	95% Queue (ft.)
Rte 3 (Plank Road)	Eastbound	L	67.6	E	249	70.45	E	534.65	253.8	F	233	125.59	F	778.15
		T	67.1	E	693	12.97	B	534.65	103.7	F	1079	27.54	C	778.15
		R	0.1	A	85				0	A	75			
		Overall	66.8	E					118.6	F				
	Westbound	L	86.1	F	34	0.5	A		104.2	F	187	1.01	A	
		T	33.8	C	418	17.85	B	282.04	200.8	F	1651	37.13	D	641.59
		R	17.2	B	75	6.6	A	282.04	25.5	C	1597	13.75	B	641.59
		Overall	31.6	C					170.6	F				
Carl D Silver Pkwy./ Mall Ct	Northbound	L				79.14	E	71.1				83.86	F	103.17
		T	85	F	131				96.5	F	97			
		R	76.2	E	68	86.14	F	71.1	91.3	F	73	95.47	F	103.71
		Overall	81	F					93.6	F				
	Southbound	L	205.3	F	819	77.73	E	218.87	237.5	F	1116	153.06	F	1251.26
		T	221.6	F	724				235.5	F	947			
		R	0.1	A	527	3.27	A	218.87	0.7	A	558	39.61	D	1251.26
		Overall	166.7	F					170.6	F				
OVERALL			**62.1**	E		**18.75**	B		**149.7**	F		**43.7**	D	
HCM 2000 V/C Ratio (Synchro)			**1.1**						**1.33**					

Route 3 at Carl D Silver Parkway/Mall Court: Preferred Alternative

Several factors were used to create a comparison matrix that would help determine the preferred alternative for Route 3 at Carl D Silver Parkway. These factors include safety, operations, construction costs, ROW impact, construction time, and access management. A weight was added to each of these categories based on importance. The alternatives were then ranked either 1 or 2 with 1 being the least desirable alternative and 2 being the more desirable for each category and then multiplied by weight. The weighted score for each category was added for the total value for that alternative. **Table 23** provides a summary of the scoring matrix. Alternative 2 performed better than Alternative 1 with a score of 24 to 15. Alternative 2 outperformed Alternative 1 in all categories except safety, where both alternatives tied for the same score. During discussion with the SWG, due to the cost and complexity of both alternatives neither one was identified as the preferred alternative. Further conversation and consideration are needed to better determine which alternative, if either, was preferred at this location.

Table 23: Route 3 at Carl D Silver Pkwy/Mall Ct. Alternative Scoring Matrix

Ranking Factors	Weight	Weighted Scored	
		Alternative 1	Alternative 2
		Ramp Flyover (with new connector)	Flyover without connector & thru cut design
Safety (CMF)	**3**	2	2
Operations	**3**	1	2
Construction Cost	**2**	1	2
ROW Impact	**2**	1	2
Construction Time	**1**	1	2
Access Management	**1**	1	2
Total		**15**	**24**
Ranking Score: From 1 (worst option) to 2 (best option)			

Conclusion

A SWG meeting was held on January 19, 2024, to determine the preferred alternatives for each intersection. During the SWG meeting, a preferred alternative was decided for the intersection of Route 3 and Taskforce Drive (Alternative 3 – Thru Cut Design), and Route 3 and Central Park Boulevard (Alternative 2 – Modified Partial Median U-Turn – no Westbound left-turn movement, additional Westbound through lane). However, because of the complexity of the alternatives at the other two intersections, no preferred alternative was decided on at the meeting. The complexity included the challenges of construction along Route 3, while maintaining consistent flow of traffic, utility and ROW impacts, and the high costs of the alternatives. After the SWG meeting, follow-up meetings were conducted with VDOT and the SWG to determine whether this study will proceed to Phase 3 of the Project Pipeline. During these meetings, the following were discussed to decide if this study should proceed to Phase 3:

- The center turn overpass and flyover alternatives might trigger an Operational and Safety Analysis Report (OSAR), which would make it challenging to be ready for a Round 6 SMART SCALE application.
- The implementation of these alternatives is also linked to the alternative at the other two intersections.
- These alternatives are spot improvements and cannot fix the major operational issues along Route 3.
- The costs of these alternatives cannot be justified if some of the movements of the intersections are still expected to fail with LOS F.

After much discussion, VDOT and OIPI decided not to proceed to Phase 3, and assured the rest of the SWG that other funding sources can be utilized to further study Route 3 in a larger/regional scale to address the issues more completely.

For the proposed thru-cut design at the intersection of Route 3 and Taskforce Drive, VDOT decided not to advance the recommended improvements to Phase 3. Instead, VDOT plans to use existing internal resources and roadway crew to implement the changes. These improvements are to include signing, pavement marking, and traffic signal modifications.